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FILTER-PASSING AGENT AS A CAUSE OF ENDOPHTHALMITIS*

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It has long been known that certain supposedly virus diseases, notably herpes zoster, may occasionally produce intraocular inflammatory complications, but the possibility that a virus may cause endophthalmitis as an isolated symptom in man has not, heretofore, been indicated. Current opinion is inclined to regard all cases of uveitis as produced either by some specific infection, such as syphilis or tuberculosis, or as the result of a focus of bacterial infection elsewhere in the body. While the present report represents the results of a study of an isolated and, perhaps, in some respects, peculiar case of uveitis, the indication that uveitis, even as an isolated symptom, may be caused by a filter-passing agent is not without interest. It seems desirable, therefore, to report in some detail the results of both clinical and laboratory studies made on even this single case.

CASE REPORT

In the autumn of 1935, a young white woman, aged 25 years, was admitted to the Wilmer Institute, complaining of ocular pain and loss of vision. Her family history was entirely negative. Her parents and six siblings were all living and well. Her general health had always been excellent. She had had the usual childhood diseases without complications, but had never had any serious injuries nor any operations. She had few upper respiratory infections; no headache nor toothache, nor any trouble with her ears. There was no history of cardio-respiratory, gastro-intestinal, genito-urinary, nor neuro-muscular disease. Her habits were regular and she took no drugs.

Six weeks prior to her admission her eyes had become red and inflamed and during the next week she began having photophobia and lacrimation, but the symptoms were not severe until two weeks before admission, when she noticed severe aching in her eyes and headaches, generally worse at about 4 a.m., and associated with considerable blurring of her vision. For a short time prior to her admission, the vision in the left eye had improved slightly.

On admission, her temperature was 99.6° F. (rectal), pulse 100. General examination aside from the eyes was entirely negative.

There was very slight swelling of the lids and moderate conjunctival and pericorneal congestion with marked tenderness to pressure over the ciliary region in each eye. The pupils were already partially dilated by a mydriatic but were reported previously to have reacted nor-

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mally. Examination with the corneal microscope revealed, in each eye, that the cornea was normal, but that there were large numbers of cellular deposits on its posterior surface. The anterior chamber was of normal depth, but the aqueous ray was heavy. The iris appeared edematous, somewhat congested, with the normal markings partially obliterated. There was one small posterior synechia in each eye. Vision was: R.E. 20/70, L.E. 20/40, not improved by lenses or pinhole. Visual fields showed normal peripheral outlines, but a marked enlargement of the blind spot in each eye. Ophthalmoscopic examination revealed a fine vitreous dust slightly blurring the fundus details. The discs were quite congested with somewhat blurred margins, the physiological cups were obliterated, but there was little elevation of the discs. The retina surrounding the discs appeared edematous, the vessels in some places being obscured. The arteries were narrow, veins full and tortuous, no hemorrhages nor exudates were seen.

In the effort to discover the cause of this condition, a great number of examinations were performed. Examination of the nose and throat revealed a hypertrophic left tonsil but no evidence of focal infection. There were no dead teeth, nor was there evidence of oral sepsis. Neurological examination revealed no involvement of any nerve other than the optic. Examination by a gynecologist disclosed no genito-urinary disease.

Laboratory tests revealed normal blood chemistry, including sugar, nonprotein nitrogen, uric acid, calcium, cholesterol, and phosphorous. There were 4,900,000 R.B.C.; 5,700 W.B.C.; hemoglobin was 74 percent; differential count showed P.M.N. 79 percent, juvenile neutrophiles 2 percent, lymphocytes 15 percent, large mononuclears 4 percent, no eosinophiles nor basophiles. Urine examination was negative save for occasional white blood cells in the sediment. An intracutaneous tuberculin test was positive to 1 mg. O.T. but negative to lower concentrations. An intracutaneous uveal pigment test was negative, as were also the blood Wassermann reaction, blood culture, and an agglutination test for typhoid and melitensis. X-ray films of the sinuses, teeth, and chest revealed no evidence of disease.

Two weeks after admission, lumbar puncture was performed. There were 70 cells, all mononuclears, per cubic millimeter in the spinal fluid. A second lumbar puncture one week later showed 40 cells. At this time the spinal fluid was cultured, some was injected into a guinea pig, and an anti-formin concentration was made. All these procedures gave negative results. A third tap one week later again revealed 70 cells and a fourth tap one month after the third revealed 22 cells. Spinal-fluid Pandy and Wassermann tests, also the gold curve were negative.

The patient showed little change during her first two weeks' stay in the hospital. She had a slight, somewhat irregular fever with afternoon peaks that reached as high as 101° F. on one occasion. There was slight relative tachycardia. At the end of two weeks, the temperature and pulse rate both began to return to normal. At about the same time the external ocular congestion decreased. The aqueous ray became less intense and the posterior synechiae began to break up. A week later the papilledema showed some diminution, but on the fourth week after admission the patient had a mild relapse with increased ocular congestion, fresh synechiae, and increased blurring of the optic disc. It was not until two months after admission, 3½ months after the onset, that a decided and permanent improvement set in. The patient was discharged

2½ months after admission, her vision having returned to 20/20 in the right eye, 20/30 in the left. Two months later her vision was 20/15 in each eye. The fundi showed faint areas of choroidal depigmentation about the discs, and there had been no relapse in her condition. The patient was last seen in the summer of 1936, at which time no further change was noted.

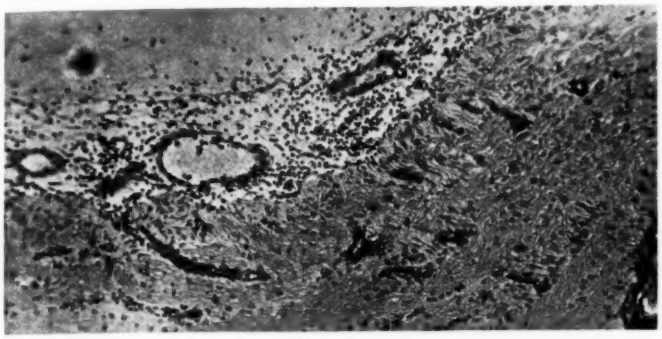

Fig. 1 (Friedenwald and McKee). Optic disc of a rabbit showing a reaction in the uninoculated eye.

The spinal fluid obtained from the third and fourth taps was used for animal inoculation.

Experimental

The spinal fluid obtained in the third lumbar puncture was bacteriologically sterile. Within one hour after its removal it was injected into three rabbits as follows: Rabbit 1 received 0.1 c.c. of the fluid in the vitreous of the right eye, 0.2 c.c. intracranially, and 0.2 c.c. intratesticularly. Rabbit 2 received the same intraocular and intracranial injections. Rabbit 3 received the same intracranial injection and in addition scarification and inoculation of one cornea. There was no reaction to the intracranial, corneal, or testicular inoculations. The animals all remained in good general health and showed no neurological symptoms. Rabbit 2 showed no reaction to the intraocular injection beyond that attributable to trauma. There was minimal conjunctival congestion on the day following the inoculation but this cleared in 24 hours and no further developments were noted, though the animal was kept under observation for two months. Rabbit 1 showed no reaction for four days following inoculation. On the fifth day the inoculated eye became slightly congested. There was a faintly positive aqueous ray and one small synechia. The vitreous was slightly hazy and there were extensive ill-defined greyish-white areas in the periphery of the retina associated with small retinal hemorrhages. On the following day the vitreous haze had increased slightly. Fluid was aspirated from the vitreous and inoculated into another rabbit. This fluid was bac-

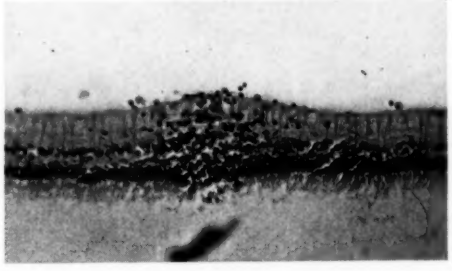

Fig. 2 (Friedenwald and McKee). Retina of a rabbit showing a reaction in the uninoculated eye.

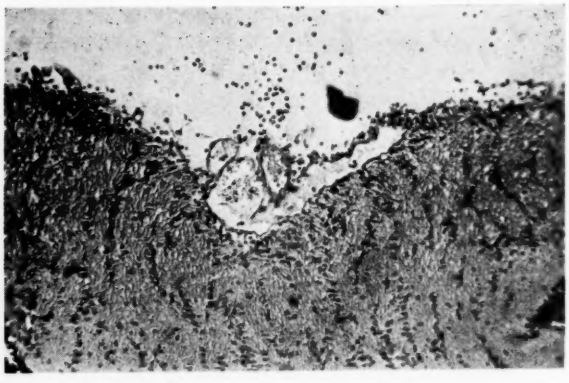

Fig. 3 (Friedenwald and McKee). Optic disc of the inoculated eye of a rabbit.

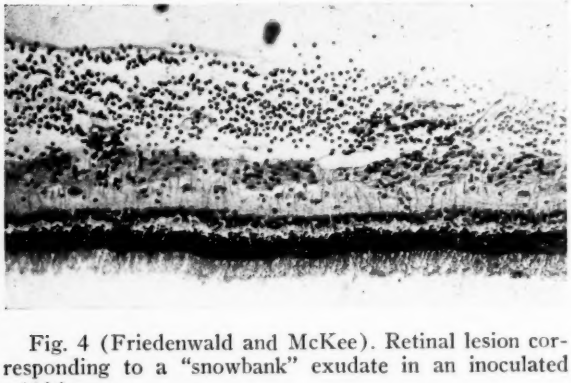

Fig. 4 (Friedenwald and McKee). Retinal lesion corresponding to a "snowbank" exudate in an inoculated rabbit's eye.

Fig. 5 (Friedenwald and McKee). Nodular lesion in the pars plana of the ciliary body of a rabbit.

teriologically sterile. Further animal passages were made in series as described below.

The spinal fluid obtained from the fourth lumbar puncture of the patient was bacteriologically sterile on culture, and 0.1 c.c. of the fluid was inoculated into the vitreous of one eye of each of three rabbits. One of these rabbits showed no reaction to the inoculation, but the other two developed lesions similar to those seen in rabbit 1. From each of these one or more passages were made, yielding positive results.

Animal passages

Rabbits. The infection obtained in rabbit 1 was transmitted in series through seven successive sets of rabbits. During the first three of these passages the method of transfer was as follows: A small amount of fluid was aspirated from the vitreous of the infected eye and injected directly without filtration into the vitreous of another rabbit. The aspirated eye was then removed and ground with broken glass. A small amount of salt solution was added, and the emulsion was filtered through a Berkefeld V filter, and the filtrate inoculated into the eyes of one or more animals. It was found that the fluid aspirated from the vitreous of infected eyes within the first six days after inoculation was capable of producing the infection on inoculation into another animal, but the material aspirated later in the course of the disease was no longer infectious. On the other hand, the ground-up ocular tissues after filtration through a Berkefeld filter were found to be infectious even in the third or fourth week of the disease, and this method alone was used in further passages.

In all, fourteen rabbits were inoculated

with such filtrates and all showed substantially the same clinical course as that described in regard to rabbit 1. On the first day after inoculation, there was usually an insignificant traumatic reaction which disappeared by the next day. After a short symptomless interval, fresh lesions were seen which usually made their appearance on the fourth to seventh day after inoculation. At this time the infected eyes usually showed slight pericorneal congestion and a positive aqueous ray. About one half of the infected eyes showed synechiae. There was at this time some haze in the vitreous, often diffuse, sometimes dusty, sometimes in the form of fluffy grey masses. At the same time the optic disc was congested and its margins were hazy. Retinal lesions, which were present in every successful transfer, were usually found in the lower periphery (opposite the site of injection) and were of two types. Some were small fluffy greyish spots about one-half to one p. d. in diameter; others were large, densely white, with soft outlines, often associated with petechial hemorrhages. In many instances both types of retinal lesions were seen.

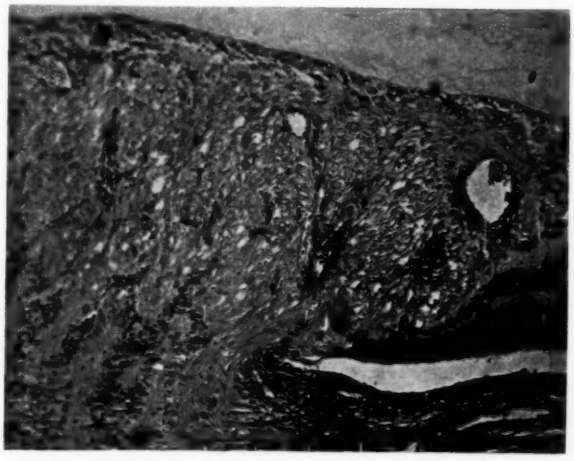

Fig. 6 (Friedenwald and McKee). Optic disc of the inoculated eye of a dog.

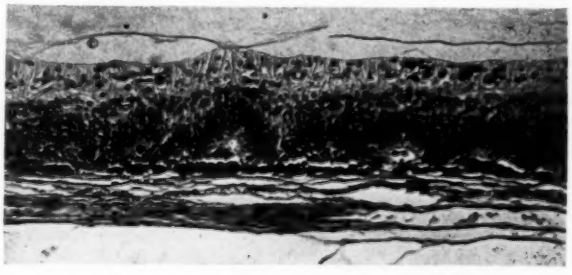

Fig. 7 (Friedenwald and McKee). Retinal lesions in a dog.

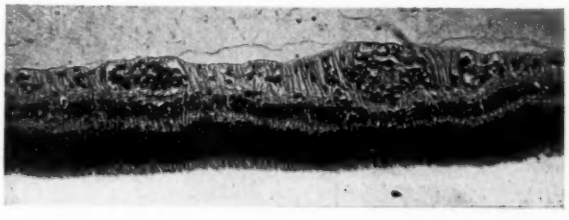

Fig. 8 (Friedenwald and McKee). Retinal lesions in a dog.

After the first appearance of these lesions they generally increased in intensity for two or three days and then slowly regressed, with occasional relapses and fresh extension of the lesions as late as four weeks after inoculation. In regressing, all of the symptoms tended to disappear, but the large white patches of the retina remained longest and in some instances were still present as late as six months after inoculations.

No constitutional symptoms were noted in the course of the disease. In a few instances the rectal temperature was recorded but found to be normal. In only one instance did lesions appear in the uninoculated eye. This occurred in the one instance in the series in which the Berkefeld filtrate used was found to have become accidentally contaminated with

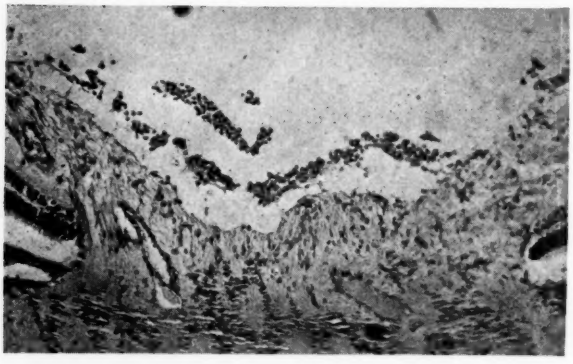

Fig. 9 (Friedenwald and McKee). Optic disc of inoculated cat's eye.

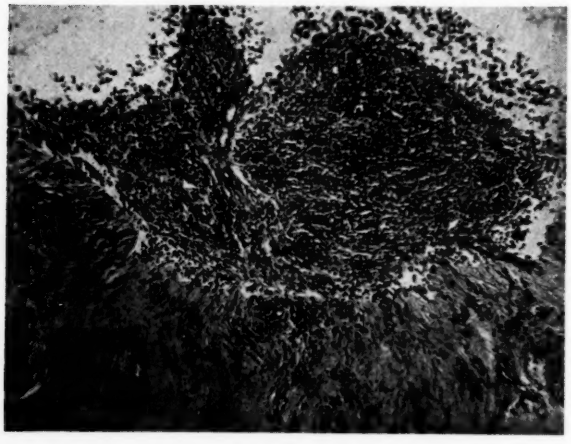

Fig. 10 (Friedenwald and McKee). Optic disc of inoculated cat's eye.

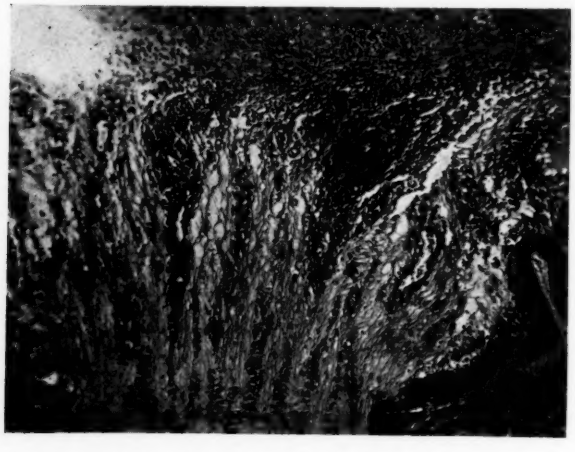

Fig. 11 (Friedenwald and McKee). Optic disc of inoculated cat's eye.

bacteria. While we have not been able to repeat the findings in this experiment, they are of sufficient interest to warrant detailed report.

Rabbit 4, which had been inoculated directly from rabbit 1, showed the usual course of symptoms described above. On the seventh day after inoculation, this animal was killed, and fluid was aspirated from the vitreous of the affected eye and injected into rabbit 5. The eye of rabbit 4 was then removed, emulsified, and filtered, and the filtrate inoculated into the right eye of each of two rabbits, 6 and 7. Subsequently the filtrate was found to be contaminated with a large gram-positive bacillus. Rabbit 5 showed no reaction to the inoculation. Rabbits 6 and 7 both developed purulent panophthalmitis in the inoculated eye in which gram-positive bacilli could be demonstrated on smear and culture. Rabbit 6 showed no lesions in the uninoculated eye, but on the fifth day after inoculation, rabbit 7 showed slight pericorneal congestion in the uninoculated eye, slightly turbid aqueous, several fine synechiae, diffuse vitreous haze, congestion and blurring of the disc, and some large white patches in the lower periphery of the retina. Since, in our experience, bilateral reactions to unilateral purulent infections in rabbits have never occurred, we feel that the metastatic lesion in this case was probably due to the filter-passing agent. The eye was removed for histological study (fig. 1). Further successful passages were made from the bacteria-free fil-

trate of the right eye of rabbit 7.

In view of the relatively mild course of the disease in rabbits, the effort was made to find some other more susceptible animals. At various stages in the course of the rabbit passages, attempts were made to infect rats, mice, guinea pigs, dogs, and cats.

Rats and Guinea Pigs. The Berkefeld filtrate of an infected rabbit's eye was inoculated into each of three rats and three guinea pigs. At the same time some of the fluid was injected into the eye of another rabbit. This rabbit developed typical lesions. A small amount of the fluid was injected intraocularly into one eye of each of the rats and guinea pigs, 0.1 c.c. was injected into one testicle of each animal, and 0.1 c.c. was injected into the cerebrospinal fluid just below the foramen magnum. None of the animals developed testicular lesions nor constitutional symptoms. Two of the three rats developed an intraocular hemorrhage, probably traumatic, but showed no other recognizable ocular lesions. Two of the three guinea pigs showed on the fourth day after inoculation slight pericorneal congestion, contracted pupils, and slight haziness of the vitreous. The congestion and pupillary contraction disappeared in two days, but the vitreous haze increased slightly for one week and then began to subside. It was concluded that these species were relatively resistant to the infection.

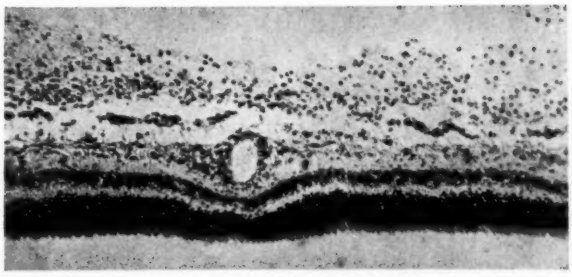

Fig. 12 (Friedenwald and McKee). Retinal lesions in a cat.

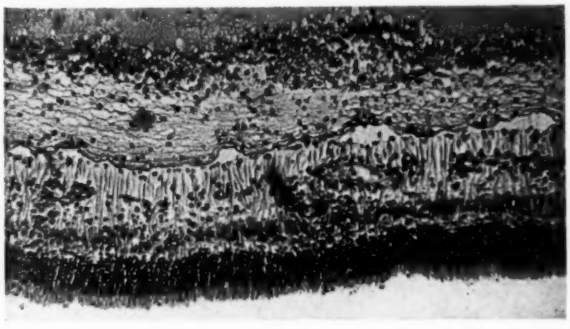

Fig. 13 (Friedenwald and McKee). Retinal lesions in a cat.

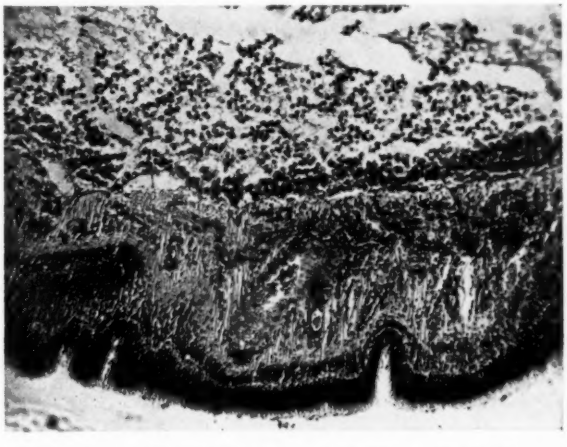

Fig. 14 (Friedenwald and McKee). Retinal lesions in a cat.

Mice. On three occasions groups of three to ten mice were inoculated intracranially with Berkefeld filtrates of infected-rabbit or -cat eyes. No symptoms developed attributable to the inoculation. It was concluded that mice are resistant to the infection.

Dogs. After five rabbit passages an effort was made to transmit the infection

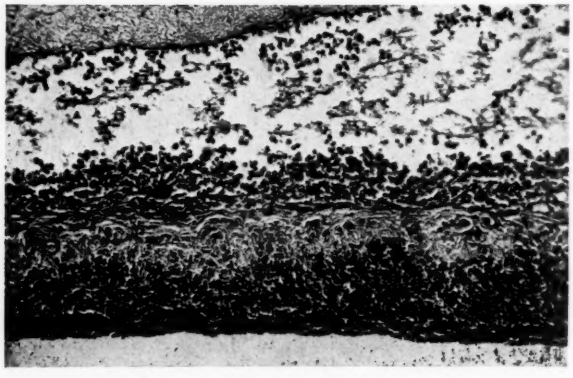

Fig. 15 (Friedenwald and McKee). Retinal lesions in a cat.

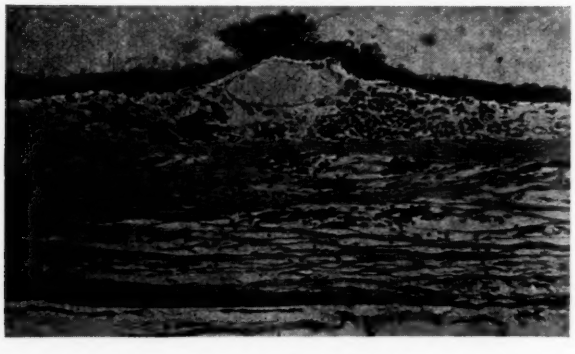

Fig. 16 (Friedenwald and McKee). Nodular lesion in pars plana of the ciliary body of a cat.

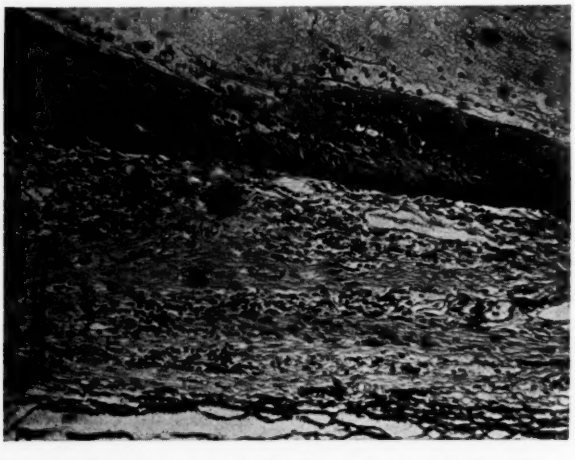

Fig. 17 (Friedenwald and McKee). Lesions in the ciliary body of a cat.

to dogs. The eye of an infected rabbit was emulsified and filtered through a Berkefeld filter, and the filtrate was injected intraocularly into one eye each of one rabbit and two dogs. The rabbit developed typical lesions. In the dogs there was an insignificant traumatic reaction which disappeared on the second day after inoculation. On the next day, however, an inflammatory reaction developed in the eyes of both animals. In one there were moderate pericorneal congestion, positive aqueous ray, vitreous haze, and congested optic disc and retina. The inflammatory reaction increased in severity for a few days and then began to subside. By the end of two weeks after inoculation the eye had returned to normal. The second dog showed a much more severe reaction. On the third day after inoculation there were marked pericorneal congestion, numerous cellular deposits on the back of the cornea, hemorrhage in the anterior chamber, and slight posterior synechiae. The vitreous was hazy, the optic disc blurred and congested. A week after inoculation the exudate and hemorrhage in the anterior chamber had been partially absorbed, and numerous areas of greyish haze could be seen in the retina. Three days later, fluid was aspirated from the vitreous of this eye and inoculated into the eyes of two more dogs. The aspirated fluid was sterile on culture. The reaction to this first transfer in dogs was more severe than that to the initial material derived from a rabbit. In one animal the bulbar congestion was intense. A large hemorrhage appeared in the anterior chamber on the third day and a deep cor-

neal haze subsequently developed. In the other animal, moderate pericorneal congestion, positive aqueous ray, hazy vitreous, congested retina and optic disc, and grey spots in the retina characterized the course of the reaction, which persisted for three weeks before beginning to subside. The eye showing the most severe reaction was emulsified and filtered through a Berkefeld filter. The filtrate was inoculated into one eye each of a rabbit, a cat, and a dog. The rabbit showed a typical reaction. The dog developed a reaction similar to that of the animal from which the inoculum was derived. The cat developed even more severe lesions.

Cats. The reaction of cats to the infection was so severe that the clinical appearance at times resembled a pyogenic infection. The following technique for passage was, therefore, regularly used. The injected eye was removed, emulsified in saline with broken glass, and the emulsion filtered through a Berkefeld or Seitz filter. At the same time the eye of a control cat was removed and similarly treated. The "virus" filtrate and "control" filtrate were each injected into one or more cats for passage. Cultures were made of all filtrates and were uniformly found to be bacteriologically sterile. In spite of all precautions, occasional bacterial infections developed in both the "virus" and "control" series. Filtration, however, always successfully removed the contaminant and on passage the "control" ani-

Fig. 18 (Friedenwald and McKee). Lesions in the ciliary body of a cat.

Fig. 19 (Friedenwald and McKee). Lesions in the ciliary body of a cat.

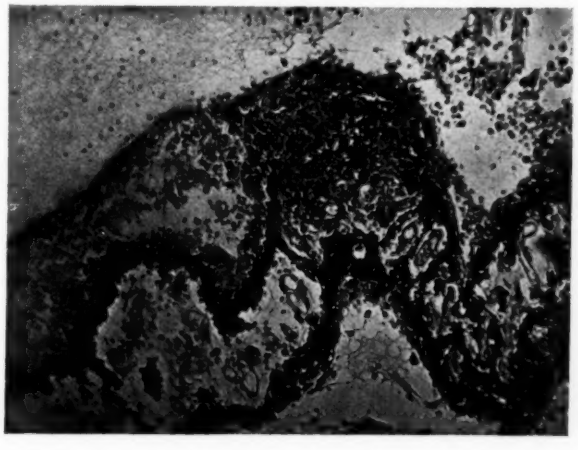

Fig. 20 (Friedenwald and McKee). Lesions in the ciliary process of a cat.

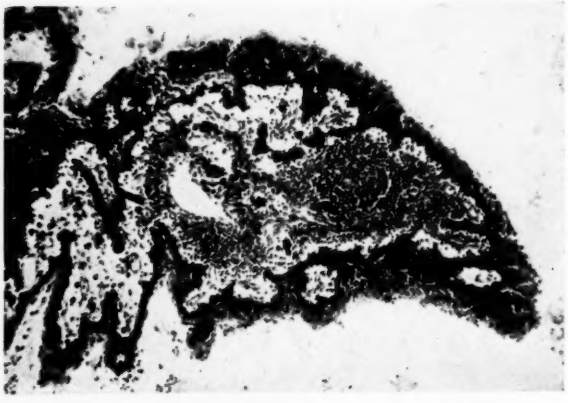

Fig. 21 (Friedenwald and McKee). Lesions in the ciliary process of a cat.

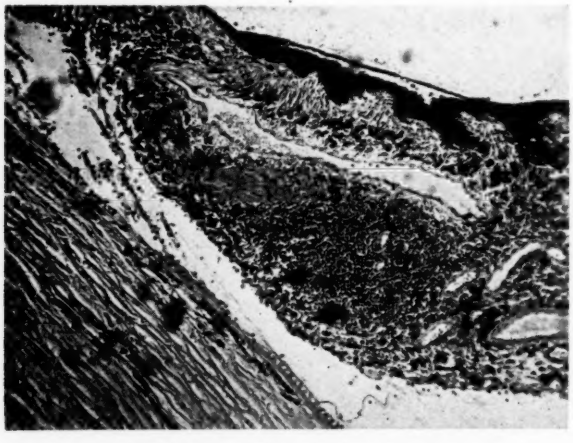

Fig. 22 (Friedenwald and McKee). Lesions in the iris of a cat.

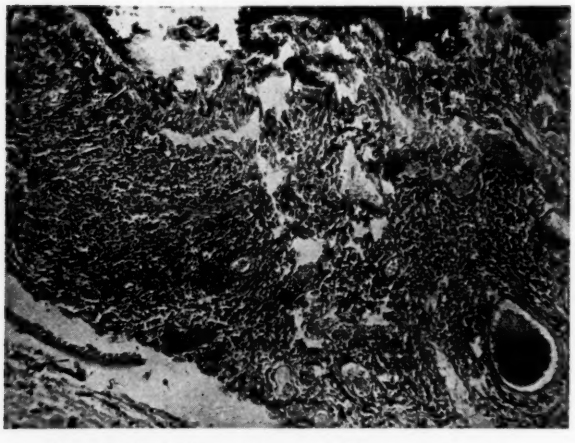

Fig. 23 (Friedenwald and McKee). Lesions in the iris of a cat.

mal showed no symptoms while the "virus" animal showed the characteristic "virus" reaction. In all, 28 passages in series have been made involving a total of 63 cats infected with the "virus" and 28 "control" cats.

The reaction of the cats to intraocular injection was as follows. There was usually a slight traumatic reaction which subsided on the second day. On the 3d to 7th day after inoculation, slight congestion of the eye appeared, associated with dusty opacities in the vitreous. During the first week the animals often appeared to be sick, lost weight, and showed fever of 1 to 3 degrees. The inflammation progressed in severity and by the end of the second week extensive synechiae and heavy cellular deposits on the back of the cornea were usually present. At this stage, massive hemorrhages in the anterior chamber were often seen. If the eyes were not enucleated, secondary glaucoma commonly developed.

During one period, Seitz filtration was used exclusively for passage, and it was found that the severity of the reaction gradually decreased from passage to passage. When Berkefeld filtration was reintroduced, the severity of the reaction reappeared after the second passage and has been maintained since.

Repeated attempts have been made to induce an intraocular reaction without intraocular injection, infectious material being inoculated intravenously, intracranially, or into one eye only. In no instance has there been any

clinical evidence of infection of an uninoculated eye, but microscopic sections have commonly shown a very slight polymorphonuclear infiltration in the ciliary body and anterior vitreous in such cases. The "virus" has, however, repeatedly been recovered from the spinal fluid of infected animals and, on one occasion, from the nasal discharge.

Cat 10 showed a typical ocular reaction. Five weeks after inoculation the animal was killed. Seitz filtrates were made of the eye and brain of this animal and each inoculated separately into one eye of cat 12. Both eyes of cat 12 showed typical reactions. Four weeks after inoculation cat 12 was killed. The Seitz filtrate from one eye of this cat was inoculated into one eye of cat 13, while the other eye of cat 13 received an injection of spinal fluid from cat 12. Both eyes of cat 13 showed typical reactions. After 4 weeks, spinal fluid was obtained from cat 13 and inoculated intraocularly into cat 15. This cat showed a typical ocular reaction and in addition a marked nasal discharge. Nasal washings obtained from cat 15 were filtered through a Seitz filter and inoculated intraocularly into cat 17, yielding a typical reaction. The spinal fluid of cat 17 was injected intracranially into cat 18, yielding a mild illness with fever and coryza, but no intraocular reaction. Spinal fluid from cat 18 was injected intraocularly into cat 24, yielding a typical reaction,

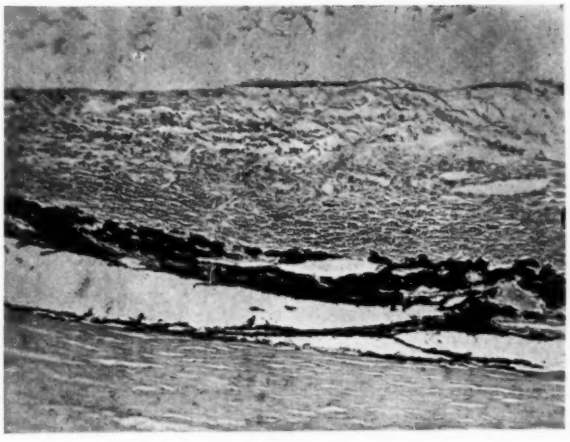

Fig. 24 (Friedenwald and McKee). Retina of a cat's eye six months after inoculation.

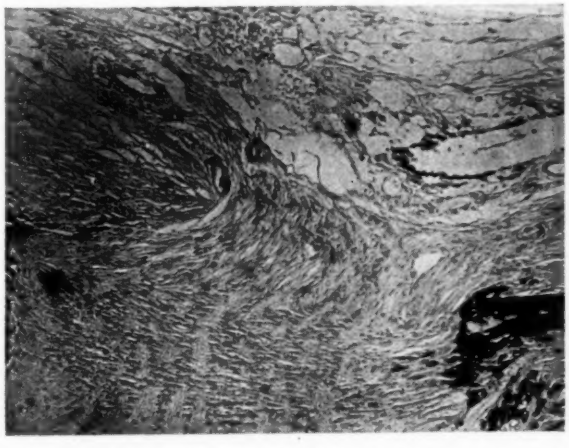

Fig. 25 (Friedenwald and McKee). Optic disc of a cat's eye six months after inoculation.

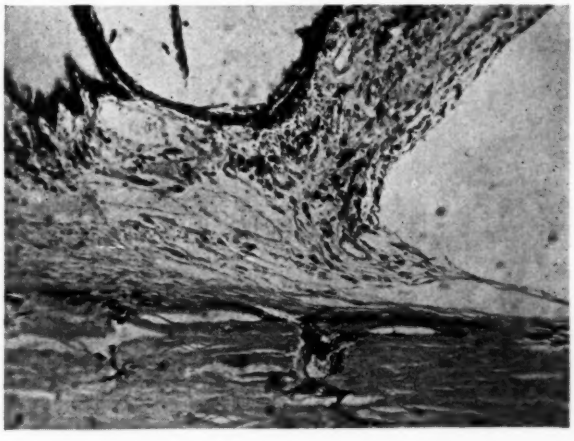

Fig. 26 (Friedenwald and McKee). Chamber angle of a cat's eye six months after inoculation.

and further eye-to-eye passages were made from cat 24.

Attempt at cultivation of the "virus" on chick embryos

The bacteriologically sterile Berkefeld filtrate of a "virus"-infected cat's eye was inoculated onto the chorio-allantoic membrane of an eight-day chick embryo. On the fourth day after inoculation a transfer was made to another eight-day chick embryo, and successive transfers were made every fourth day from chick to chick for eight passages. No lesions were seen on the membranes of the first two chick embryos of this series, but after the third transfer small raised plaques appeared on the chorio-allantoic membrane, and this reaction persisted up to the eighth transfer. From the eighth chick embryo bacteriologically sterile material was obtained which was injected into the eye of cat 66. At the same time, material from a normal chick embryo was injected into the eye of cat 67. Both cats 66 and 67 showed some reaction attributable to the foreign protein but the reaction of cat 66 was more severe than that of 67. The Berkefeld filtrate of the eye of cat 66 yielded severe reaction on transfer and further passages in series were successfully performed, whereas the Berkefeld filtrate from the eye of the control cat 67 produced no reaction on the next or succeeding transfers.

Preservation of the "virus"

After several successive passages of the virus by Berkefeld filtration from eye to eye in cats, an effort was made to test the viability of the "virus" in storage. An infected cat's eye was removed 3 weeks after inoculation and the intraocular tissues were emulsified with ground glass in a small amount of saline solution. The resulting emulsion was centrifuged at low speed for five minutes. The supernatant fluid was then poured off and filtered through a Berkefeld V filter. Three cubic centimeters of a 50-percent solution of glycerine in saline was added to the sediment and this was stored under vaseline seal in a refrigerator. A small portion of the Berkefeld filtrate of the supernatant fluid was injected into a cat's eye and produced a strong reaction. The remainder of the Berkefeld filtrate was covered with sterile melted vaseline and stored in a refrigerator.

Three months later, these stored materials were used for inoculation. The glycerinated sediment was ground up in a mortar, centrifuged at low speed for five minutes, and the supernatant fluid was injected into the eyes of cat 80. Since the violent reaction which ensued might be attributable to the irritant effect of the glycerine, a further passage was made by Berkefeld filtration two weeks later from cat 80 to cat 84, yielding a typical and severe reaction. Similarly, the stored Berkefeld filtrate, after being kept in the refrigerator for 3 months was injected into cat 81. A mild reaction resulted but further passage produced again the typical severe reaction.

Pathological examination

In the course of this investigation, the eyes of many infected and control animals were removed at various intervals after inoculation and subjected to histological examination. Up to the present it has been impossible to demonstrate specific inclusion bodies in any of the material studied. The pathological changes found in the eyes of rabbits, dogs, and cats were all more or less similar in form and distribution but showed marked difference in intensity. The least intense reaction was that of rabbits.

In these animals the inflammation of

the uveal tract was insignificant. There were serum and a few mononuclear cells in the anterior chamber, and scattered mononuclears in the iris and ciliary body. No lesions were seen in the choroid. The vitreous contained some serum, and cellular infiltrations were present near the retina, in front of the optic disc, and in the zonular fibers. Scattered patches of round-cell infiltration were found in the retina with microscopic evidence of tissue destruction. In some animals, extensive and intense regions of preretinal infiltration were seen, corresponding to the large white areas noted ophthalmoscopically. In the cases examined late in the disease, these preretinal infiltrates were found to have become organized by glial proliferation.

The changes most regularly found in rabbits' eyes and seemingly most characteristic of the infection were in the optic disc. This was swollen both laterally and forward. An accumulation of cells was usually present in the cup, and there were perivascular infiltrates in the optic disc and, at times, also in the optic nerve. The one instance of what we regard as a metastatic lesion occurring in the uninoculated eye of a rabbit whose other eye was infected with the "virus" showed all of these features. The perivascular infiltrates in the optic disc were particularly intense and extensive.

In dogs the inflammatory reaction was much more intense than in rabbits. The iris and ciliary body showed extensive diffuse mononuclear infiltrates with occasional nodular accumulations of round cells, either perivascular or in the stroma of the tissue. Fine fibrinous adhesions were found between the iris and lens. In several instances there was a massive hemorrhage in the anterior chamber and a diffuse cellular infiltration in the cornea. There was, however, remarkable lack of evidence of any extensive tissue destruction in the iris and ciliary body, and the choroid was not affected. The vitreous was filled with serum, and many mononuclear cells of all types were present, especially in the preretinal portions. Extensive destructive lesions were found in the retina with focal round-cell infiltrations. The reaction at the optic disc was intense, with massive infiltrates filling the cup, intense edema, and occasional hemorrhages in the disc and surrounding retina, and massive perivascular infiltrates.

In cats the lesions of the retina and optic disc were similar to those in dogs, but, in general, the involvement of the iris and ciliary body was more intense. Large nodular accumulations of lymphocytes were commonly found in these tissues. In the ciliary body not only the stroma but also the epithelium was involved in the inflammatory reaction, small nodular regions of epithelial destruction and mononuclear infiltration were frequently seen. Those cats with severe reactions that were allowed to survive the illness eventually developed secondary glaucoma with peripheral anterior synechiae. The retinal tissue in these cases was completely disorganized and replaced by massive sheets of glial proliferation.

The microscopic examination of the brains, testes, and visceral organs of cats and rabbits did not reveal any lesions attributable to the "virus."

Discussion

The experimental results reported above indicate clearly that a filter-passing agent such as is commonly termed a virus has been secured which is capable of causing a severe endophthalmitis in cats and dogs. Owing to the fact that numerous passages were made in rabbits before the infection was transferred to dogs and then to cats, the question may be raised

as to whether the disease which we have investigated most extensively in cats is really related to that of the patient from whom the infectious material was originally obtained. It is conceivable that during the passage through rabbits and dogs, some virus, native to these animals, was accidentally obtained, and that it is this virus, rather than one originating from the patient, with which we have infected cats. Unfortunately for the purposes of this investigation, the patient had made a complete recovery from her disease before the relatively high susceptibility of cats to the infection had been discovered, and direct inoculation from the patient into cats was, therefore, not made. We have, however, been able to travel part of the road back to the source by inoculating material which had previously sustained many passages through cats back into rabbits and have produced again in rabbits mild lesions clinically identical with those originally produced by injecting the patient's spinal fluid into animals of this species. We believe, therefore, that it is most probable that the virus whose lesions in cats we have studied is actually identical with that obtained from the patient, and that, therefore, the disease from which the patient suffered was due to this same agent. The remote possibility that the disturbance in the patient's eyes and spinal fluid may have been unrelated requires mention.

None of the animals which we have infected in the course of these studies has developed symptoms which we could recognize as characteristic of any known and previously studied virus. The possible relation of this virus to two others requires, however, further comment.

In 1929, Woods and Chesney demonstrated that "periodic ophthalmia" of horses was produced by a virus. These authors inoculated rabbits intraocularly with the Berkefeld filtrate of the eye of a horse suffering with this disease. Passage was made by Berkefeld filtration from rabbit to rabbit in series, and finally back to a horse, yielding in the horse characteristic symptoms of periodic ophthalmia. The lesions produced by the virus in rabbits were extremely mild, consisting essentially of a slight diffuse haze of the vitreous and plaques of white exudation in the retina. However, inoculation into horses of material obtained from normal control rabbits failed to produce any disease in horses. It is apparent, therefore, that the lesions produced in rabbits by the virus of periodic ophthalmia were clinically similar to those which we have reported here. We have studied the reactions of rabbits to three different strains of periodic-ophthalmia virus and have noted a close similarity of these reactions to those produced by the virus which we have been studying. In general, however, the periodic-ophthalmia virus causes a much less severe reaction in rabbits than does the virus which we have been studying. We have attempted to demonstrate cross immunity between these various strains but have failed as yet to demonstrate any immunity in rabbits even to strains with which they have been previously infected. It is evidently necessary to pursue these comparisons in other species, but for the present, we are of the opinion that the two viruses are not identical, though they may be related.

During the past few years a new clinical entity has been described under the name of a benign lymphocytic meningitis and has been shown to be due to a virus. The causative agent of this disease, however, is fatal to mice. The immunity of mice to the virus which we have obtained serves to dissipate any notion that the two might be identical.

Summary

A case is reported of bilateral uveitis with papillitis and increased cell count in the spinal fluid. On animal inoculation of the spinal fluid from this case a filter-passing agent such as is commonly called a virus was secured which produced characteristic intraocular inflammatory lesions when inoculated into the eyes of rabbits, dogs, and cats. The virus passes the Berkefeld V filter more readily than it does the Seitz filter. It can apparently be cultivated on the chorio-allantoic membrane of chick embryos and can be preserved for several months in anaerobically sealed Berkefeld filtrates of infected tissues and in glycerinated emulsions of infected tissues. The virus produces in rabbits lesions somewhat similar to those produced by the virus of periodic ophthalmia of horses, but the evidence at hand would indicate that the two viruses were not identical.

Discussion

Dr. Albert L. Brown, Cincinnati: Dr. Friedenwald's observations concerning the isolation of a filtrable virus capable of producing endophthalmitis upon intraocular injection into animals is of great interest. The report lends itself to discussion in three parts: (1) The virus as an isolated phenomenon, (2) its action on the eye and other organs, (3) its relation to the pathogenesis of human uveitis.

(1) The human case reported is apparently one of uveitis, albeit with certain unusual characteristics. The description of the eyes suggests a composite of bilateral optic neuritis and generalized uveitis, which the essayist wisely calls endophthalmitis. In the absence of all other findings in the patient, a virus was isolated from the spinal fluid which survived many intraocular passages in animals. This may simply attest the vitreous as a favorable medium for the virus, but not necessarily specific properties of the latter to produce ocular lesions. (2) The ocular reactions in the various animals were all produced by direct intraocular injection. These reactions, especially in cats, seemed severe endophthalmitic effects rather than any specific tissue entity seen in humans. The lesions, especially those revealed by the microscope, were lodged variously in the retina, optic nerve, and uveal tract. The predominant tissue effects depended upon the species of animals used. Experimentally, the virus could not be said to produce any characteristic ocular pathologic entity. The ocular reactions caused by the virus were well studied but observation of its action on other organs seemed inconclusive. The negative effects of intratesticular and intracranial injections are given in several instances. The results of intrathoracic and intra-articular injections in a fair series of the same species of animals, if negative, would help to affirm an ocular specificity. As a matter of interest, I should like to have known the results of intravenous injection of the virus in animals previously receiving intraocular injection after the reaction had subsided. (3) Repeated extraocular injections of the virus in animals, even in the sensitive cats, failed to produce an ocular reaction. This may have been due to the inability of the virus to survive bodily passage in these animals. The virus may be more hardy in the human. Tests for skin sensitivity of the patient to the virus might have been interesting. The author carefully avoids the assumption that the virus produces uveitis in humans, but contents himself with noting its intraocular effects. This stand seems fair. The evidence of the patient's eyes and the

animal injection suggests that the virus is an isolated phenomenon and probably the cause of this individual case of endophthalmitis. Thus, another interesting and puzzling observation has been added to the enigma in ophthalmology, intraocular inflammation.

DR. S. HANFORD MCKEE, Montreal: It is unnecessary in an audience of this kind to do any more than recall to your minds how frequently, in certain cases of uveitis, routine examinations disregard tuberculosis and other systemic disease, and focal infection is found to be negative, leaving the question of etiology entirely obscure and the consequent symptomatic treatment equally unsatisfactory.

Dr. Friedenwald's report will serve to bring to your attention the increasing importance of viruses as a cause of disease in man. The predilection of disease for nervous tissue is well recognized as exemplified in infantile paralysis.

Dr. Friedenwald's report opens a new field as regards the etiology of the disease of the uveal tract and may be the means of throwing much light upon the cause of disease of this area.

The technique of transmission to susceptible animals has been carefully and thoroughly carried out, so that any laboratory with modern equipment should be able to verify the history of this case. It is hoped others will follow the lead Dr. Friedenwald has given us, so that the splendid piece of work may be corroborated.

THE EFFECTS OF SULFANILAMIDE AS DETERMINED IN THE EYES OF RABBITS*

V. C. Rambo, M.D.
Boston

The literature now abounds with clinical and experimental evidence that sulfanilamide has a wide range of usefulness in combating various infections. Goldenberg[1] reports a case of staphylococcic orbital cellulitis and sinus thrombosis successfully treated with sulfanilamide, but in the literature no mention is made of the clinical use of sulfanilamide in combating infections of the eye itself. Moreover, no investigations have apparently been made of the effects of sulfanilamide, using the eye as an experimental organ.

Its accessibility, sensitivity, and strong walls make the eye especially suitable for testing the usefulness of a drug in combating local infection. An infection in the eye does not tend to disseminate over the whole body. The conjunctiva is a mucous membrane and is easily seen. The cornea, aqueous, and lens are transparent media which permit ready observation of the progress of intraocular infection. The vitreous is an avascular colloidal substance, practically free from fixed cells. The aqueous chamber is filled with a fluid similar to cerebrospinal fluid and normally contains practically no cells. Drugs, cells, and serum can reach the aqueous readily from the vascular iris and ciliary body.

Obviously, before sulfanilamide can be used clinically in the conjunctival sac, subconjunctivally, in the anterior chamber, or in the vitreous it must be ascertained whether it can be so used safely. Dr. F. H. Verhoeff[2] has found that several substances—for instance, gentian violet—in concentrations that sterilize the eye and still cause no gross change in it, destroy the retinal function. For this reason it is necessary to ascertain whether this danger is present also in the use of sulfanilamide.

Dr. George A. Filmer,[3] interne at the Massachusetts Eye and Ear Infirmary, used 0.5-percent sulfanilamide solution for irrigation of the conjunctival sac, every 5 minutes for 1½ hours, employing a cat, then a rabbit, and then one of his own eyes. No irritation, pain, or other reaction was noted at the time of irrigation, during the intervals, after an hour and a half, or the next day. There was also no delayed reaction.

Experimental

Ocular tolerance of sulfanilamide

By appropriate experiments on the eyes of rabbits, I have demonstrated that sulfanilamide can be safely used in the conjunctival sac as a saturated aqueous solution, a very fine powder, or as a 50-percent suspension in olive oil. The saturated solution or the suspension of the drug can be injected subconjunctivally without producing irritation.

Investigations were made as to the effects of injections of a saturated aqueous solution of sulfanilamide into the anterior chamber. The anterior chamber of one rabbit was emptied of aqueous and filled with sulfanilamide solution. No reaction occurred in the cornea, and the anterior chamber remained clear. The iris showed no congestion. The pupil, however, became moderately dilated and did not react to light for 7 days. The pupil then slowly regained in full its contraction power.

* From the Howe Laboratory of Ophthalmology, Harvard University, and the Massachusetts Eye and Ear Infirmary.

The blink reflex was not affected at any time.

Next the effects of injections of a heavy suspension of sulfanilamide into the anterior chamber were observed. The anterior chamber of a rabbit was evacuated and then filled with a suspension of sulfanilamide powder in cold water (100 mg. to 1 c.c.). This, as did the solution, caused the pupil to cease reacting. It also produced a slight exudative iritis, with a gray exudate around the pupil and in the lower portion of the anterior chamber. The cornea and lens were unaffected. With the slitlamp crystals were seen in the anterior chamber 24 hours after the introduction of the drug, showing that here, at least for 24 hours, the drug was in a saturated solution in the aqueous. After two weeks a complete return of the eye to normal resulted.

The effects of injections of a saturated aqueous solution of sulfanilamide into the vitreous were ascertained in a third experiment. Into the vitreous of one rabbit, 0.3 c.c. of a saturated aqueous solution of sulfanilamide, and into that of another rabbit the same amount of an aqueous suspension, were injected. No external congestion resulted, and the pupillary and blinking reactions to light were never impaired. A moderately dense, filamentous branching, localized opacity in the vitreous followed. The fundus could be seen around this opacity. Within a day or two, slight congestion of the iris occurred, and some cells appeared in the anterior chamber, but within a week the eye was completely normal except for the vitreous opacity.

Into one eye of each of two rabbits, instead of an aqueous solution, the following solution was injected:

Sulfanilamide	7.3
Sodium chloride	8.5
Na_2HPO_4 (m/10)	2.7
Distilled water	ad 1000

The injection of this solution caused a much heavier opacity in the vitreous than did the aqueous solution of the drug. In one rabbit, after three weeks, definite congestion of the iris occurred, with cells in the anterior chamber, and has persisted for two months. The normal blink and pupillary response to light were never interfered with, showing that the retinal function, as in the previous experiments, was at no time affected. Unfortunately, the eye of the other rabbit was used for another purpose at the end of two weeks. This experiment suggests that sodium phosphate may render sulfanilamide deleterious to tissues. The question should be investigated further.

The introduction of an oily suspension of sulfanilamide (1 part sulfanilamide to 1.5 parts olive oil) into the anterior chamber caused a pannus and interstitial keratitis. By this method sulfanilamide could be kept in the anterior chamber for 10 days, but damage to the cornea was marked. It is of interest that the sulfanilamide crystals disappeared before the oil. The presence of oil alone in the anterior chamber was moderately irritating to the cornea, but the sulfanilamide apparently added greatly to this irritation.

Engelfried[4] gives determinations of the amount of sulfanilamide in the different organs of the body in rabbits, resulting from its administration by mouth. However, no available literature records determination of the presence of sulfanilamide in the eye after such administration. A 2.75-kilogram rabbit was given sulfanilamide, 0.6 grams by stomach tube, at 4:00 p.m. and again at 10:00 p.m., and was killed the next morning. Chemical analyses were made by Miss Margaret Rourke of Dr. John D. Stewart's Laboratory of Surgical Research at the Massachusetts General Hospital, according to the method of E. K. Marshall, Jr., Kendall Emerson, Jr., and W. C. Cutting,[5] with the following results:

TABLE 1

DISTRIBUTION IN BLOOD AND OCULAR TISSUES OF INGESTED SULFANILAMIDE

	Free mg. %	Total mg. %	Conjugated mg. %
Whole blood	1.4	5.4	4.0
Plasma	1.5	4.8	3.3
Vitreous	2.9	5.0	2.1
Aqueous	2.4	4.1	1.7

Lens: In two lenses weighing 0.675 grams there were 0.0374 mg. free sulfanilamide. In 100 grams of lens there would be 6.0 mg.

These determinations indicate that sulfanilamide readily diffuses from the blood into the aqueous, the vitreous, and the lens. It is, perhaps, noteworthy that it becomes more concentrated in the lens than elsewhere.

THE USE OF SULFANILAMIDE, BY GASTRIC ADMINISTRATION, FOR COMBATING INTRAOCULAR INFECTIONS

Into the right anterior chamber and into the left vitreous of three rabbits was injected 0.05 c.c. of a 1:1000 dilution of a 24-hour culture of hemolytic streptococci.* (Such an injection in each control experiment, whether into the anterior chamber or vitreous, invariably destroyed the eye.) Sulfanilamide by stomach tube was given to each rabbit as follows:

To rabbit 356, sulfanilamide (100 c.c. of a saturated solution) was given by stomach tube twice a day, a 16-hour interval elapsing between doses. Treatment was begun at the time the infection was introduced into the eyes. Injection of streptococci into the vitreous of the left eye resulted in the whole eye, anterior chamber, and vitreous becoming purulent within 4 days. Injection of streptococci into the right anterior chamber resulted in infection starting but being completely overcome in 4 days without damage to the eye. On this same eye, the same experiment was repeated at the end of 9 days and again 11 days later, with the same result in each instance. Using rabbit 364, the above experiment was repeated, with the exception that the treatment was given regularly 3 times a day. In the left eye, 18 hours after the injection, examination with the ophthalmoscope showed a gray mass in the vitreous at the site of injection. Apparently this was a colony of streptococci. Around this mass the vitreous was clear. Seven hours later, the colony had become definitely larger. The 3d day it was found that there had been no further increase in the size of the colony, which now appeared more coarsely granular. On the 4th day, the opacity had become slightly larger, and there appeared to be some liquefaction of the vitreous around it. On the 5th day, the colony was smaller, more coarsely granular, while the surrounding vitreous remained clear. The rabbit became ill from an epidemic disease prevalent on the rabbit farm. On the 6th day, the right eye was still clear; the left eye showed the vitreous completely filled with exudate, but the anterior chamber clear. The animal was so ill that treatment had to be discontinued. On the 7th day, the rabbit was found dead. The autopsy report was: O.D. normal; O.S. anterior chamber and vitreous full of purulent exudate. In this experiment, the infection was held in check while the rabbit was well. Lack of resistance of the rabbit caused the vitreous to fill quickly with exudate, although the anterior chamber still remained clear. When the concentration of sulfanilamide became low, from discontinuing its administration, the anterior chamber filled with pus.

* The streptococcus used in our experiments was the Streptococcus hemolyticus, mucoid variant, human and mouse virulent, used by Gay and Clark,[6] and obtained from them by Dr. Champ Lyons of the Massachusetts General Hospital. A suspension of streptococci was made by diluting with normal salt solution, 1:1000, a 24-hour culture in peptone and horse serum. This suspension contained about five organisms in each high-power field, when examined in a dried smear.

Using rabbit 359, the above experiment was repeated, except that the administration of sulfanilamide was begun 24 hours before the injection of streptococci. The right eye showed no observable sign of infection, except infiltration of the cornea at the site of the needle puncture, 48 hours after the injection. This was not noted the day following. In this experiment, presumably because of preliminary treatment, a much smaller colony of streptococci formed in the left vitreous than in rabbit 364. However, in spite of the preliminary treatment, 3 days after the cocci had been introduced, a slight further growth of the colony took place. The next 2 days the colony became more granular. On the 6th day, one administration of sulfanilamide was delayed 3 hours. On the 7th day, one administration of sulfanilamide was purposely omitted. On the 8th day the colony had grown and the vitreous surrounding it was cloudy—infection had rapidly extended. Resumption of regular treatment again caused the growth of the colony to cease, as observed on the 9th day, and the vitreous surrounding the colony to clear markedly. On the 10th day, the first observation made with the slitlamp disclosed cells in the anterior chamber, but no other evidences of infection. To the naked eye the aqueous was clear. Treatment was continued until the 16th day, with only one dose omitted. In spite of this, the opacity in the vitreous grew somewhat, but the vitreous was clear around it. Then the vitreous became more cloudy, and on the 18th day the vitreous was white to the lens, and iritis with slight posterior synechiæ had developed. Still the aqueous was clear to the naked eye and the pupil and iris grossly normal. A second attempt to infect the right anterior chamber caused an inflammatory reaction for 3 days; it then subsided entirely. Sulfanilamide was discontinued on the 19th day. On the 22d day, the left eye showed the picture of so-called pseudoglioma, often seen in children, following metastatic abscess of the vitreous, when the infection has been finally overcome. The eye was free from congestion, the aqueous was clear, the pupil occluded, and behind the lens was a white mass. The eye was soft.

Using two rabbits, both of whose eyes had become purulent from streptococcus infection, effort was made to sterilize these intraocular abscesses by giving sulfanilamide by mouth for 5 days. None of the 4 eyes were found sterile on culture at the conclusion of treatment.

These experiments on rabbits' eyes demonstrate a method of observing the progress of a given organism's growth in an acellular living sulfanilamidized culture medium. The response to the injection of the organism into the anterior chamber indicates the probable effect that sulfanilamide administration will have on an infection with that organism, in the eye and, presumably, in other portions of the body.

To determine whether leucocytes are present in the aqueous following injection of streptococci into the anterior chambers of rabbits sufficiently sulfanilamidized to protect the eyes, the following experiments were made:

To each of 3 rabbits, 0.7 gm. of sulfanilamide was given by mouth, and the dose repeated 9 hours later. A suspension of streptococci was then injected into one anterior chamber of each rabbit. Six hours later, fluid aspirated from each of these anterior chambers was found to be highly albuminous, and to contain leucocytes and extra- and intracellular streptococci. A control eye of a rabbit which was not given sulfanilamide showed even more cells in the anterior chamber 6 hours after injection of streptococci than did those of the sulfanilamidized rabbits. These experiments showed that leucocytes are ex-

uded into the vitreous soon after infection of the anterior chamber, whether or not sulfanilamide is present in effective concentration.

Bucy[7] reports a case of optic neuritis resulting from sulfanilamide administered by mouth to a girl aged 16 years. The administration of a sulphate with the sulfanilamide was mentioned as possibly having something to do with the toxic manifestations. On each of three occasions, after administering a single tablet, general manifestations occurred, including temporary severe loss of vision, apparently due to toxic optic neuritis. Other reports of the toxicity,[8] complications, and fatalities following the use of sulfanilamide continue to appear in the literature.[9, 10, 11] Obviously, such untoward effects could be avoided and its usefulness greatly extended if the drug could be effectively used locally.

Jaeger[12] reports the use of prontosil locally with striking success in a great number of patients who had not responded to other routine treatment. He tried the alcohol-acetone solution, also the watery solution with and without glycerine. Among the conditions in which he found the solutions useful were: lupus erythematosis, burns, carbuncles, varieties of eczema, furuncles, and axillary abscesses. He obtained no response to the drug in psoriasis. For wounds, he also used a watery solution of the drug, and states that when sutures are soaked in such a solution the wounds heal much more cleanly and leave less scar tissue at the site of the sutures.

Sulfanilamide has been given intrathecally, as reported by Millett,[13] with no apparent irritation locally, though he reports Schwentker and his associates having thus used the drug with untoward results. Injections were made intraperitoneally by Hawkins[14] and by ourselves. No irritation was noted. Dr. J. D. Stewart,[15] for its general administration, has made use of the saturated solution by hypodermoclysis.

Mellon, Gross, and Cooper[16] state that their experiments show no indication that phagocytosis is a factor in the mechanism of the therapeutic action of these drugs (that is, sulfanilamide, and allied compounds). They also state that they have found "no qualitative changes in the character of the histologic response to the hemolytic streptococcus as a result of sulfanilamide administration." The administration of sulfanilamide to mice before infection either completely protected the animal or greatly modified the course of the infection in comparison with control animals. However, Smith[17] says that the sulfanilamide had no prophylactic value in checking the spread of tonsillitis under epidemic conditions. The local use of sulfanilamide is encouraged by Gay and Clark[6] who say that "there is no evidence that the cell reaction which finally accounts for the disposal of the organism is other than local."

Osgood[18] reports that concentrations of sulfanilamide 1:1000 or less in human marrow cultures did not grossly affect the marrow cells or alter their growth characteristics. He also reports that sulfanilamide manifests its typical bacteriostatic action on the beta hemolytic streptococcus in cultures of bone marrow in test tubes. His work further encourages us in the belief that the drug may be useful when used locally as well as generally.

To expect sulfanilamide to be effective locally, it would need to be applied not only in steady, sufficient concentration, but also for a sufficient length of time. The concentration required for its action in certain infections is 10 mg. to 100 c.c. of blood, and the time required for beneficial effects varies from a few hours to days.

Sulfanilamide is relatively insoluble,

0.6+ grams per 100 c.c. water. It is, however, next to sodium chloride, one of the most diffusible drugs known.

The local use of sulfanilamide for combating intraocular infections

Into one anterior chamber of each of 4 rabbits (350, 360, 351, and 355) 0.02 gm. of sulfanilamide was injected as a suspension in water. The anterior chambers of both eyes were then infected with a suspension of streptococci. In 3 of the 4 eyes into which sulfanilamide was injected, the reaction was about the same as if sulfanilamide suspension alone had been injected, and the eyes returned to normal within a week. In the other treated eye, the infection was delayed 5 days, but the eye then succumbed to the infection. The control eyes were severely infected within 48 hours, and became completely purulent in 4 days.

Into one vitreous of a rabbit (336) 0.01 gm. of sulfanilamide was injected as a suspension in water. The vitreous of both eyes was then injected with a suspension of streptococci. The infection in the sulfanilamidized eye was delayed 1 day. This experiment was repeated in another rabbit, except that a saturated solution of sulfanilamide was used. The infection of the vitreous in the sulfanilamidized eye was delayed 2 days, and extension of the infection into the anterior chamber 6 days. Control eyes were lost from infection in 3 days and 4 days, respectively.

Into one anterior chamber of rabbit 362, sulfanilamide 0.02 gm. in olive oil was injected. The anterior chamber of both eyes was then infected with a suspension of streptococci. In the sulfanilamidized eye, the white sulfanilamide in the oil could be seen in the lower portion of the anterior chamber. It became less from day to day. The anterior chamber was protected from infection for 4 days. The infection, however, was not completely overcome and evidently entered the vitreous. As the sulfanilamide was observed to disappear, evidences of infection increased, and the eye was lost from infection. The control eye was completely lost in 3 days. The rabbit was killed. The amount of sulfanilamide in the sulfanilamidized eye was 1.0 mg. per 100 c.c., an insufficient amount to protect even the anterior chamber.

The vitreous of one eye of a rabbit was injected with 0.10 gm. of sulfanilamide in oil, and then with a suspension of streptococci. The sulfanilamide in oil could be seen in the vitreous. No change in the vitreous was seen for 6 days. Then the vitreous became completely filled with exudate. However, the anterior chamber of the eye continued grossly normal, the iris and pupil being well seen until the animal was killed, 12 days after the experiment was begun. In the cornea, however, a pannus had been developing, and considerable pannus was present at the death of the animal. The eye was autopsied. The vitreous was filled with pus and some oil. The anterior chamber was grossly clear. It was predicted that about 10 mg. percent of sulfanilamide would be found in the ocular contents, because the infection which had so destroyed the vitreous had left the anterior chamber relatively uninjured. On making a chemical analysis, it was found that the contents of the eye contained 10 mg. percent of sulfanilamide.

Into one anterior chamber of a rabbit (361) was injected olive oil, 0.20 cm., without sulfanilamide. Both anterior chambers were then injected with suspensions of streptococci. Within 3 days, both eyes were markedly and equally purulent. The oil alone had no effect whatever in controlling the infection.

Into one anterior chamber of a rabbit (338) a suspension of streptococci was introduced. Sulfanilamide in olive oil, 0.5 c.c. (0.2 gm. sulfanilamide) was introduced subconjunctivally around the eye. The infection was not delayed at all.

After 3 days, 0.15 c.c. sulfanilamide and oil was introduced into the anterior chamber. This had no appreciable influence on the infection.

Both eyes of two rabbits (357 and 9) were infected by injecting streptococci into the vitreous. Twenty-four hours later, sulfanilamide 0.03 gm. was injected into the vitreous of the right eye. The infective process was not checked to any extent by the sulfanilamide.

Into the vitreous of one eye of rabbit 342 sulfanilamide 0.02 gm. was injected in a watery suspension. After 24 hours the vitreous of each eye was injected with streptococci. Three days later, no difference in the reactions of the two eyes to infection was noted, both eyes becoming filled with pus.

Conclusions

The eye is an excellent organ in which to test the action of sulfanilamide. The rabbit stands sulfanilamide well. The injection of a saturated solution of sulfanilamide into the conjunctiva, or directly into the anterior chamber, produces no permanent observable damage to the eye. Injection of sulfanilamide into the vitreous produces moderate opacity of the vitreous, and after a few days a low-grade iritis of short duration, but has no demonstrable effect on the retinal function.

Sulfanilamide by mouth in adequate, regularly repeated doses, markedly checks the growth of an observable culture of hemolytic streptococci in the vitreous of a rabbit. But even if the treatment is continued, the vitreous eventually becomes completely purulent.

When streptococcus hemolyticus is injected into the anterior chamber, sulfanilamide administered by mouth for only 4 or 5 days not only checks but permanently overcomes the infection.

Obviously, leucocytes can reach organisms in the center of the vitreous much less readily than they can reach organisms in the anterior chamber. Hence our experiments support the view that sulfanilamide alone inhibits streptococci, but that to destroy the organisms, leucocytes and possibly other factors are early required in addition.

Injection of streptococci into the anterior chamber with 0.20 gm. of sulfanilamide in water suspension, has protected 3 out of 4 eyes from infection as effectively as sulfanilamide by mouth. That the protection was not from the blood stream was proved by the fact that the other eyes of the same rabbits, injected with hemolytic streptococci and not treated, were lost from the infection. It is, therefore, evident that sulfanilamide is effective when used locally only. It is very important, however, that the sulfanilamide be kept at an effective concentration at the site of infection. This is difficult to accomplish because of the great diffusibility of the drug.

These experimental observations indicate that, properly administered, sulfanilamide, will overcome certain intraocular infections. They do not indicate, however, that it will save the eye in a case of rapidly progressive purulent endophthalmitis such as may follow accidental or operative trauma. Sulfanilamide by mouth should be useful in treating less virulent infections already established in the anterior chamber, or even in the vitreous. Other treatment, however, such as the use of diphtheria antitoxin, should be employed in addition, especially when the vitreous is infected. Sulfanilamide in 0.5 percent or saturated solution, as a powder, or as an ointment, may be used locally for infections of the conjunctiva or cornea. If the requirement of sufficient, constant, necessary strength of solution is fulfilled, and the organisms are susceptible to the drug, the results should be good. In recent wounds of the cornea or conjunctiva, sulfanilamide solution may be used as a cleansing agent, all needed surgery

then done, and sulfanilamide powder dusted into the wound.

Our experiments confirm Jaeger's conclusion,[12] based on clinical observations, that sulfanilamide is of service by local application. However, he was possibly overenthusiastic concerning the number of conditions which he found benefited by the local use of sulfanilamide. Other methods of applying the drug locally than have been mentioned by Jaeger may prove successful in local infections which are not amenable to known treatment. However, the giving of sulfanilamide by mouth, in addition, should not be omitted unless contraindicated by the general condition of the patient or by special circumstances.

The local use of sulfanilamide, even if of itself insufficient, may make the amount needed by mouth much smaller, and vice versa. In certain conditions, full local and general treatment may be needed—for instance sulfanilamide might be dusted into the conjunctival sac as well as given by mouth, in a case of pneumococcic ulceration of the cornea.

By injections of the drug into an organ such as the eye, a concentration far greater than that possible in the blood can be maintained. This greater concentration may make it possible to treat successfully local infections with organisms resistant to treatment with the drug administered by mouth.

Preliminary treatment with sulfanilamide before expected infection, as from a foreign body in the eye, or from an operation in a poor risk, should receive consideration. For this purpose, it is possible that the local use of sulfanilamide may be sufficient.

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References

[1] Goldenberg, M. Sulfanilamide in ophthalmology. Amer. Jour. Ophth., 1938, Ser. 3, v. 21, Jan., pp. 54-60.

[2] Verhoeff, F. H. Personal communication.

[3] Filmer, G. A. Personal communication.

[4] Engelfried, J. J. Observations on the absorption, distribution and excretion of sulfanilamide in normal rabbits. Univ. Hosp. Bull., Ann Arbor, Michigan, 1938, January.

[5] Marshall, E. K., Emerson, K., and Cutting, W. C. Distribution of sulfanilamide in organism. Jour. Phar. and Exper. Therap., 1937, v. 61, Oct., p. 196.

[6] Gay, F. P., and Clark, A. R. Mode of action of sulfanilamide in experimental streptococcic empyema. Jour. Exper. Med., 1937, v. 66, Nov., p. 535. Abst. Jour. Amer. Med. Assoc., Dec. 18, 1937.

[7] Bucy, P. Toxic optic neuritis resulting from sulfanilamide. Jour. Amer. Med. Assoc., 1937, v. 109, Sept. 25, p. 1007.

[8] Marshall, E. K., Cutting, W. C., and Emerson, K. The toxicity of sulfanilamide. Jour. Amer. Med. Assoc., 1938, v. 110, Jan. 22, p. 252.

[9] Schwartz, W. F., Garvin, C. F., and Koletsky, S. Fatal granulocytopenia from sulfanilamide. Jour. Amer. Med. Assoc., 1938, v. 110, Jan. 29, p. 368.

[10] Berg, S., and Holtzman, E. Fatal granulocytopenia from sulfanilamide. Jour. Amer. Med. Assoc., 1938, v. 110, Jan. 29, p. 370.

[11] Jennings, G. H., and Southwell-Sander, G. Anemia and agranulocytosis during sulfanilamide therapy. Lancet, 1937, v. 2, Oct. 16, p. 898.

[12] Jaeger, K. Ueber örtliche Prontosilanwendung. Deutsche Med. Woch., 1936, v. 45, Nov., p. 1831.

[13] Millett, J. The intrathecal use of prontosil solution. Jour. Amer. Med. Assoc., 1937, v. 109, Dec. 25, p. 2138.

[14] Hawkins, F. Pharmacological action of sulfanilamide. Lancet, 1937, v. 2, Oct. 30, p. 1019. Abst. in Jour. Amer. Med. Assoc., 1938, v. 110, Jan. 8, p. 162.

[15] Stewart, J. Personal communication.

[16] Mellon, R., Gross, P., and Cooper, F. Experimental studies with sulfanilamide and prontosil in hemolytic streptococcus infections. Jour. Amer. Med. Assoc., 1937, v. 108, May 29, p. 1858.

[17] Smith, A. Chemotherapy of streptococcic infections. Lancet, 1937, v. 2, Nov. 6, p. 1064.

[18] Osgood, E. Culture of human marrow. Studies on the mode of action of sulfanilamide. Jour. Amer. Med. Assoc., 1938, v. 110, Jan. 29, p. 349.

IRRADIATION OF THE EYE AND PROTECTIVE DEVICES

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The purpose of this communication is (1) to discuss the biologic effects of irradiating the region of the eye; (2) to indicate the possibilities of injury to the eye as a result of such irradiation; and (3) to emphasize the necessity of adequate protection of the eye during irradiation, and to indicate how this may be achieved.

Many ophthalmologists and radiologists have been reluctant to employ radiation therapy for lesions in and about the eye. This has been partly due to some of the unwarranted conclusions of Chalupecky,[1] Scholtz,[2] Birch-Hirschfeld,[3] and many others, who found from their experiments that one could seldom irradiate the eyes of animals without producing serious injury. An analytical review of these experimental data by Desjardins[4] reveals the confusion concerning the expected temporary reactions, the dosage safely tolerated by the various structures of the eye, and the complications following overdosage and improper protection.

Clinical observations, on the other hand, especially since the introduction of more recent methods of irradiation, have clarified the nature and duration of the reactions which are to be expected following this procedure.

EXPECTED BIOLOGICAL REACTIONS

GENERAL CONSIDERATIONS

The reactions upon the eye produced by X rays and radium are essentially of the same order, and will therefore be discussed together. For corresponding surface doses the immediate effects with radium filtered by one millimeter of platinum are less marked than with the most penetrating, highly filtered X rays (Regaud, Coutard, Monod, and Richards[5]). For a single course of radium treatment, a 100-percent skin erythema dose is the upper limit of safety, according to Kummer and Sallmann.[6] Not more than 300-percent skin erythema dose may be safely administered over a period of one year. For roentgen rays, Stock[7] suggests 100-percent skin erythema dose as constituting the upper limit of safety. Better protection is possible with radium than with X rays, further diminishing the intensity of the reactions (Regaud et al).

The tolerance to radiation increases with the age of the individual. The intensity of the radiation reaction is greatest in the anterior structures of the eye (lids and conjunctiva), but becomes proportionately less in its posterior structures.

ANATOMICAL CONSIDERATIONS

The ocular reactions will be considered according to the anatomical location of the tissues, proceeding from the lids anteriorly towards the retina posteriorly.

Lids. The reactions of the lids are analogous within certain limits to the radiation reaction of skin elsewhere on the body. There is, first, erythema accompanied by edema. This redness progresses to desquamation, following which complete healing of the skin takes place. The reactions vary according to the intensity of the treatment. If a cellulicidal dose is given, a typical "radioepidermite" may be observed from eight to ten days after the completion of treatment. This may present a rather alarming appearance to one unfamiliar with this type of reaction. The advanced stage of this condition (moist "epidermite") presents an angry, reddened skin, bleeding slightly from numer-

ous points, and covered by a whitish fibrinous membrane. Repair proceeds rapidly with complete epithelialization, leaving a smooth normal skin. This may take place from two to three weeks following the height of radiation reaction. There is frequently a loss of cilia which is sometimes, though not always, permanent. Even when there has been complete loss of the cilia, regeneration may occur.

Conjunctiva. In general, the conjunctival reaction occurs about three weeks after irradiation. Occasionally, this may appear as early as five to six days after the beginning of treatment, especially following interstitial radiation. The reaction increases in intensity for the first few days after onset, remains stationary for a week or more, and usually subsides within three weeks. Ordinarily, the conjunctival reaction consists of mild edema, hyperemia, and epiphora. With more intense treatment, one sometimes sees a purulent conjunctivitis, accompanied by photophobia and lacrimation. This, however, may also be due to poor ocular hygiene during treatment, and is frequently prevented by the instillation of 1-percent eosin or 1-percent mercurochrome in the conjunctival sac.

Cornea. Sometimes there is no significant corneal reaction. However, a mild temporary keratitis may develop despite minimal dosage.

Iris, lens, and structures of the posterior segment of the eye. These structures are ordinarily not affected by properly executed irradiation. This implies particularly the correct use of certain protective devices which will be discussed later.

It sometimes becomes necessary to disregard possible injury to the eye in order to administer cellulicidal doses for cancer involving the eye or its neighboring structures. For example, in irradiating a neoplasm of the antrum with possible orbital invasion, the safety of the eye becomes a matter of secondary importance. Similarly, in dealing with extensive inoperable lesions involving the eyelids and globe, the normal function of the eye may have to be sacrificed in order to eradicate the disease.

In contrast to such unavoidable effects, injuries to the eye may be the result of overdosage or improper and inadequate protection. The nature of these complications will be discussed according to the anatomic location of the part of the eye involved.

COMPLICATIONS

Lids and conjunctiva. Stock has suggested that the lids will safely tolerate no more than a 60-percent skin erythema dose.[7] In his opinion, complications may be expected when this limit is exceeded. The commonest early complication observed is the loss of cilia. If there is no sign of regeneration within several months, the loss may be considered permanent. There may be prolonged edema and redness of the lids and conjunctiva accompanied by epiphora and purulent conjunctivitis. The latter occurs more commonly with infected lesions. Therefore, it is important to eliminate infection before administering the treatment.

Patients who have had previous irradiation are exposed to the danger of radiation necrosis when additional treatment is given, unless it is carried out with the utmost precaution. It is often a problem of delicate judgment to differentiate radiation necrosis from recurrent disease.

Among the later complications are scarring of the lids, obliteration of the fornices with restricted motion of the globe, cicatricial ectropion, and painful dryness following atrophy of the lacrimal glands. Following the treatment of inner canthus lesions, the lacrimal ducts sometimes become stenosed, and epiphora or dacryo-

cystitis develops. Very rarely following ulcerating "radioepidermite" a superimposed erysipeloid reaction may occur.

Cornea. There is considerable disagreement concerning the maximum dose of irradiation safely tolerated by the cornea. From clinical experience, however, it appears that the cornea is slightly more radioresistant than the lids and conjunctiva. Superficial or deep corneal ulceration may be the result of an overdose or of the trauma incident to the insertion or removal of the applicator. This is one of the dangers of contact radiation. A mild temporary keratitis sometimes occurs, particularly when soft rays are employed. Ordinarily, spontaneous healing follows. Radionecrosis of the cornea is one of the most alarming complications. It is never encountered unless the fundamental principles and technique of radiation have been violated. It usually occurs in patients who have had several courses of treatment. It begins as an intractable ulceration of the cornea, which progresses to perforation of the eyeball. It seldom is seen earlier than three months following the completion of the last series of treatment.

Uveal tract. Apart from temporary, painful iritis following larger doses of radiation, complications referable to this part of the eye are extremely rare.

Lens. The most dreaded complication of radiation therapy for ocular lesions is lenticular opacity. This occurs less frequently than is commonly supposed. Clapp[8] in 1932 could find only 34 cases of authentic postirradiation cataract (including all the reported cases from 1903 to 1932). The larger proportion of such cases followed X-ray rather than radium treatment. A wide discrepancy of opinion exists as to the dosage which may produce cataract. There is probably a great variation in lenticular sensitivity. Prolonged treatment with highly penetrating rays is more dangerous than with softer rays. The untreated eye is subject to the development of cataract as well as the eye under treatment, if inadequately protected.

The immature lens is more prone to develop this complication because of the radiosensitivity of its embryonal cells. Consequently, infants and children should be treated most cautiously. Although lens opacities are observed as late complications, they may appear soon after treatment, especially in children. Martin[9] has reported a case of cataract which first appeared three days after the completion of treatment and became mature in seven weeks.

In older patients radiotherapy may sometimes accelerate the development of impending senile cataracts. In such cases radiation cannot always be justly regarded as the etiologic factor. The most common type of postirradiation cataract occurs from three to five years after treatment. It is important to remember that in most of the reported cases of cataract the protection was totally inadequate and that this complication is to be regarded as a serious error in technique and not a natural sequela.

Postirradiation cataract usually begins as a posterior polar degeneration (Rohrschneider[10]). This may remain localized as a posterior cortical cataract or may progress to opacificiation of the entire lens. The development of lenticular opacity may be due to disturbance in the nutrition of the lens following changes in the capillaries of the ciliary body (Milner[11]). The greatest destruction in the equatorial and posterior cortical zones is explained by the presence of the youngest, most rapidly growing, and hence most radiosensitive cells of the lens (Bossuet[12]).

Retina and optic nerve. Retinal injury is extremely rare. It manifests itself as

a destruction of the ganglion cells of the more anterior layers of the retina (Gasteiger[13]). Sometimes hyperplasia of the anterior-layer cells occurs. Because there is no similar reaction in the posterior layers, the retina is necessarily thrown into folds (retinal plication). When interstitial irradiation is employed for retinal tumors, vitreous hemorrhages, retinitis proliferans, and retinal detachment may develop (Moore[14]).

Complications involving the optic nerve are almost unknown.

A word of precaution is necessary regarding exposure to irradiation before birth or during the first two months of life. Irradiation at such times is particularly dangerous. Among the complications observed have been retardation of eye development, anomalous development of the lids, progressive degeneration of the lens, and retinal plication (Desjardins[4]).

Postirradiation ocular carcinoma is a rare medical curiosity. (Lane[15]) has reported four such cases following exposure to generalized irradiation without protection. The possibility of the complications mentioned indicates the extreme need for standardized technique and adequate protection devices.

Protection devices

In irradiating lesions in and about the eye, as in any other part of the body, it is desirable to deliver the maximum amount of energy to the diseased tissues. At the same time, it is important to protect the normal surrounding tissues from the effects of the rays. With this in mind, various devices have been employed since the beginning of radiation therapy.

Rohrschneider was of the opinion that a simple lead plate provided sufficient protection. Birch-Hirschfeld, on the other hand, found that even with the use of thick lead plates to cover the surrounding normal tissues, severe reactions frequently developed. Regaud and Coutard[5] employ a sheet of lead 2 mm. thick, covered by wax or rubber, and have observed with such protection very few undesirable effects. Richards[16] is of the impression that a silver or gold shield affords sufficient protection against the beta radiation. Kummer and Sallmann[6] maintain that adequate protection by metallic filters is impractical and impossible. In their opinion, the safest protection consists in keeping the radioactive applicator at proper distance from the surface of the globe. Repeated measurements with different dosimeters and the clinical experience of most radiologists have shown that all the methods mentioned permit the penetration of some radiation and the manifestation of unwelcome effects on the the eye.

The alpha and beta rays of radium and the longer wave-length X rays, because of their slight penetrability, exert their effect on the most superficial tissues only, and have little value in destroying the

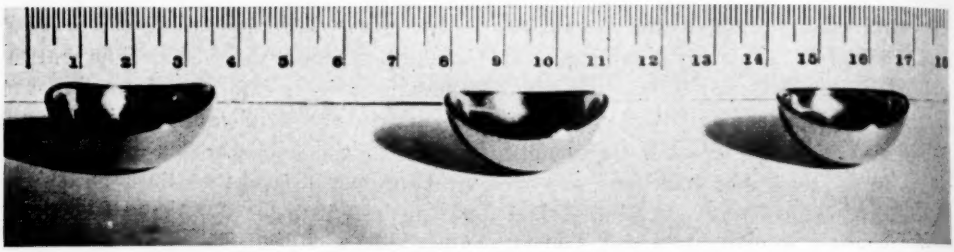
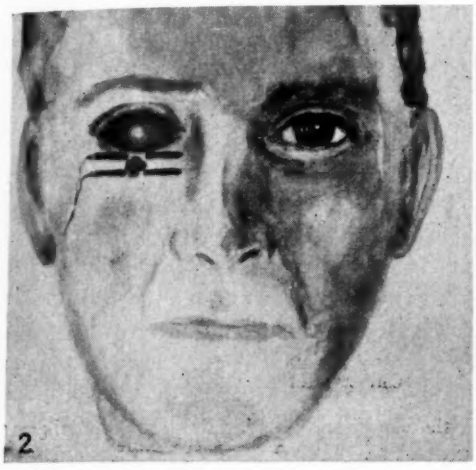


Fig. 1 (Cutler, Jaffe, and Grossman). The Wölfflin prosthesis.

more deeply situated neoplastic cells. For ordinary therapeutic purposes it is important to eliminate alpha and beta rays of radium as far as possible. The highly penetrating gamma rays of radium or the shortest wave-length X rays are the most desirable.

Experimentally, the alpha rays are absorbed by 1 cm. of air, .002 mm. of platinum, .003 mm. of silver, or .02 mm. of tissue. Beta rays are absorbed by slightly greater thicknesses of the above-mentioned materials. The beta rays are almost completely absorbed (99 percent) by 1.3 mm. of silver, 1.2 mm. of lead, or 0.6 mm. of platinum. Theoretically, then, a sheet of lead 2 mm. thick, as employed by many radiologists, should be sufficient to eliminate the undesirable rays. However, when the highly penetrating rays strike the metallic elements of high atomic weight, they cause an emission of secondary rays of the very type which the protection devices aim to eliminate. With this in mind, various methods have been employed in an attempt to eliminate secondary radiation. At the Institut du Radium of Paris a layer of wax or rubber is added to the 2-mm. thickness of lead. Rohrschneider[10] employs a prosthesis of lead glass filled with mercury. Hoede[17] has shown definitely that the lead glass prosthesis is inadequate. Using the Hammer dosimeter and Kustner measuring chamber he found that the lead glass will be penetrated by 70 percent of the hard rays. With the water phantom, the penetrability mounts to 100 percent. When the mercury is added to the lead-glass prosthesis, the situation becomes much worse, for in addition to the secondary rays emitted by the lead glass, there is the added increment of the secondary rays emitted by the mercury.



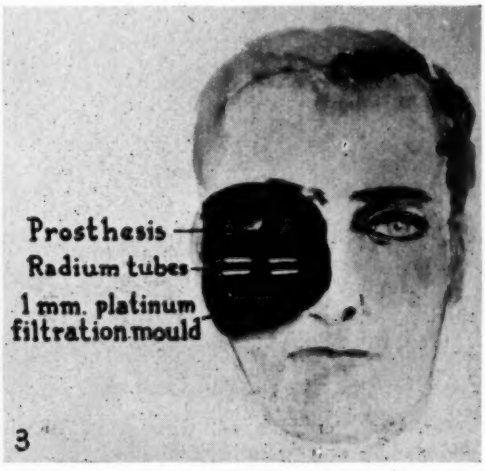


Fig. 2 (Cutler, Jaffe, and Grossman). Showing the use of radium needles in the treatment of epithelioma of the lower eyelid with prosthesis inserted under the lids to protect the eyeball.

Fig. 3 (Cutler, Jaffe, and Grossman). Showing the use of the eye mold in the treatment of epitheliomata in the region of the eye, with the prosthesis incorporated into the mold to protect the eye and eyelids.

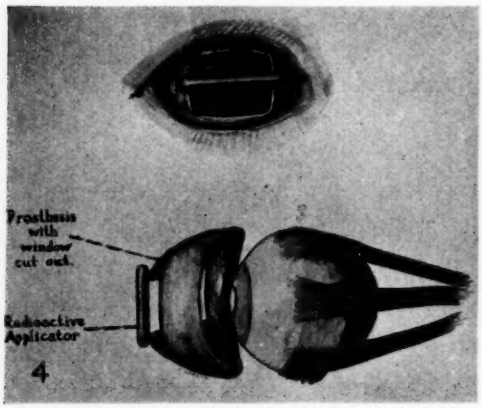
The ideal prosthesis is one that keeps out a reasonable proportion of the primary rays, and that does not itself emit secondary rays. The theoretical solution of the problem calls for a layer of metal of high atomic weight of sufficient thickness to absorb the primary rays, covered in turn by an element of very

low atomic weight which will absorb the secondary rays emitted from the heavier metal but which will itself emit no secondary rays. Wölfflin[18] seems to have devised such a theoretically correct and practically applicable instrument. His first prosthesis consisted of a layer of lead 1.2 mm. thick covered by a thin sheet of aluminum. Aluminum seemed most desirable because of its very low atomic weight (27). However, the aluminum could not be easily alloyed with the lead, and therefore proved impractical. Nickel, with atomic weight 58, could be more easily combined with lead, particularly when a very thin coating of cadmium was interposed between the two. This apparatus is only 1.3 mm. thick and weighs but 10 grams. It is easily applied and is well tolerated by the patient.

Hoede, measuring with a water phantom, found that no radiation penetrated this prosthesis under the same conditions that permitted 100-percent penetration through lead glass. Wölfflin found that only 1 to 3 percent of total radiation penetrated this instrument.

Unfortunately, clinical experience with this prosthesis is as yet insufficient to warrant definite conclusions. In Wölfflin's hands it has far excelled all previous protection devices. We have recently begun to use the instrument and are convinced that it is definitely worthy of clinical trial.

As has been mentioned previously, it it not always practically feasible to protect the eye even with such an ideal prosthesis available. An attempt will be made to indicate the degree of protection possible under the various methods of irradiation.



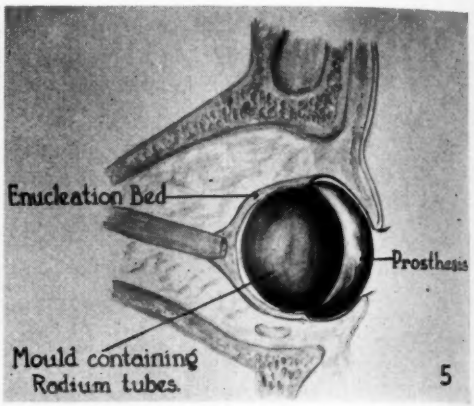


Fig. 4 (Cutler, Jaffe, and Grossman). Showing the use of the prosthesis in treating malignant lesions of the anterior surface of the globe.

Fig. 5 (Cutler, Jaffe, and Grossman). Showing the use of specially prepared mold for irradiating enucleation bed, with prosthesis for protection of the eyelids.

Interstitial irradiation. When one employs removable radium needles for the treatment of lid neoplasms, the prosthesis should be inserted under the lids in order to protect the globe (fig. 2).

Before inserting the instrument the eye is anesthetized with butyn and the prosthesis is coated on both sides with a specially prepared ointment containing 10-percent wax and 10-percent liquid petrolatum in a white petrolatum base. The protection device should be changed several times each day during the course of treatment, and the eye bathed with boric solution followed by the instillation of 1-percent eosin or mercurochrome.

Stallard and Moore[19] have described a

method for treating intraocular neoplasms by removable radium needles or seeds. When their method is employed, preservation of eye function becomes very difficult by any type of protection device.

Contact radiation. In utilizing radium molds for lesions of the skin in the orbitopalpebral area, the prosthesis can be incorporated into the mold to protect the eyeball and lids. It is necessary to protect the opposite eye as well as the eye which is in the vicinity of the lesion (fig. 3).

The protection device may also be used for treating small tumors of the anterior surface of the globe. This is accomplished by making a window in the instrument directly over the site of the lesion, and placing the radioactive applicator at a suitable distance over the orifice. The lids, meanwhile, are kept apart by adhesive. This method delivers the bulk of the energy to the site of the tumor and protects the surrounding parts of the globe (fig. 4).

For postoperative irradiation of the enucleation bed following surgery for malignant melanoma, sarcoma, glioma, and allied conditions, the prosthesis may be inserted between a specially prepared radium mold and the lids. This affords excellent protection for the lids, such as cannot be obtained when external radiation by radium pack or X rays is employed (fig. 5).

External radiation. When irradiating lesions in the orbitopalpebral region, by either high voltage X rays or radium pack, the prosthesis should be placed over the eyelids. It will then afford complete protection against rays coming via the anterior portals (fig. 6).

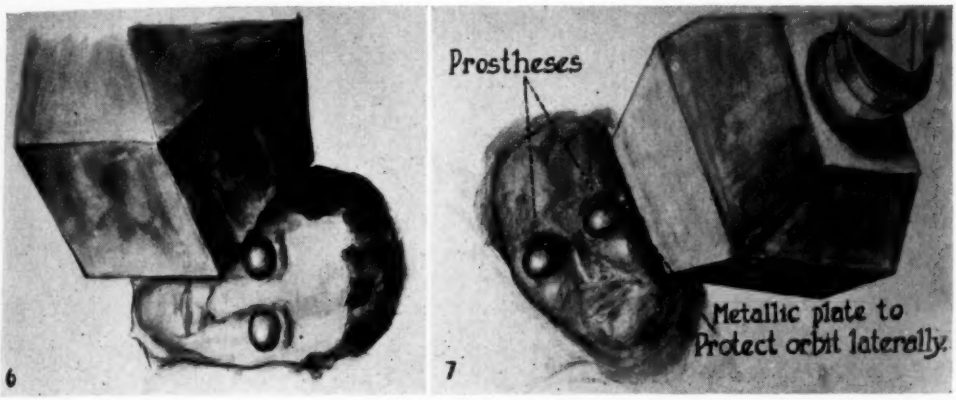


Fig. 6 (Cutler, Jaffe, and Grossman). Showing the prosthesis used to protect eye and eyelids during the treatment of lesions in the region of the eye by external irradiation with the radium pack.

Fig. 7 (Cutler, Jaffe, and Grossman). Showing the addition of a metallic plate of the same composition as the prosthesis in administering external irradiation through lateral portals.

If lateral portals are used, the prosthesis when placed anteriorly will not protect the lateral portion of the globe and orbit. We suggest the addition of a metallic plate of the same composition as the Wölfflin prosthesis (that is, 2 mm. of lead covered by nickel with cadmium interposed between the two) to be applied to the side of the face covering the lateral portion of the globe and orbit (fig. 7).

Some of the conditions for which such protection may be feasible are carcinomas of the posterior nasopharynx, alveolar ridge, floor of mouth, tongue, and tonsil.

If there is suspicion of cancer involving the region of the orbit, as with tumors of the roof of the antrum or anterior nasopharynx, no attempt should be made to protect the orbit if this will diminish the possibility of completely sterilizing the tumor. In irradiating tumors of the brain through temporal or frontal portals, protection against ocular injury is impossible because there is no means of interposing a protection device between the lesion and the eyeball.

Protection of the eye and lids is not practical in treating retroörbital tumors. Any method of treatment employed for such cases is heroic in character, and its possible success must not be compromised by any consideration for the preservation of ocular function.

Summary

1. The "normal" reactions of the eye and its appendages to radiation have been discussed.

2. The abnormal reactions, or complications, have been described in detail. It has been pointed out that many of these complications are due to violations of the fundamental principles of radiation therapy and can be obviated by careful technique and appropriate use of protection devices.

3. The nature and degree of protection against ocular injury possible with the different methods of radiation have been indicated. A type of prosthesis little known in this country has been recommended for clinical trial.

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Bibliography

[1] Chalupecky, H. Zentralbl. f. prakt. Augenh., 1897, v. 21, pp. 234-239; 267-271. (Quoted by Desjardins, 1931.)

[2] Scholtz, W. Arch. f. Dermat. u. Syph., 1902, v. 59, pp. 87-104; 241-260; 421-446. (Quoted by Desjardins, 1931.)

[3] Birch-Hirschfeld, A. Quoted by Desjardins.[4]

[4] Desjardins, A. U. Amer. Jour. Roentgenol., 1931, v. 26, p. 639.

[5] Regaud, C., Coutard, H., Monod, O., and Richard, G. Ann. d'Ocul., 1926, v. 163, p. 1.

[6] Kummer and Sallmann. Die Radiumbehandlung in der Augenheilkunde. Vienna, 1929. (Quoted by Gifford, S. R. Handbook of ocular therapeutics. Philadelphia, 1932.

[7] Stock. Röntgenbehandlung in der Augenhei'kunde. Leipzig, 1928. (Quoted by Gifford, see ref. 6.)

[8] Clapp, C. Amer. Jour. Ophth., 1932, v. 15, p. 1039.

[9] Martin, P. Trans. Ophth. Soc. U. Kingdom, 1933, v. 53, p. 246.

[10] Rohrschneider, W. Deutsche med. Woch., 1932, v. 29, p. 1126.

[11] Milner, J. G. Proc. Royal Soc. Med., 1933, v. 26, p. 1041.

[12] Bossuet, A. Arch. f. Augenh., 1909, v. 64, pp. 277-285. (Quoted by Desjardins, 1931.)

[13] Gasteiger, H., and Grauer, S. Arch. f. Augenh., 1934, v. 108, p. 498.

[14] Moore, R. F. Trans. Ophth. Soc. U. Kingdom, 1935, v. 55, p. 3.

[15] Lane, L. Surg., Gynec., and Obst., 1937, v. 64, p. 458.

[16] Richards, G. E. Amer. Jour. Roentgenol., 1936, v. 36, p. 588.

[17] Hoede, K. Med. Klin., 1934, v. 30, p. 734.

[18] Wölfflin, E. Strahlentherapie, 1932, v. 44, p. 800.

[19] Stallard, H. B. Brit. Jour. Ophth., 1933, supplement 6.

WATER CONTENT AND SOLIDS OF CATARACTOUS AND SCLEROSED HUMAN LENSES*

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A comparative study of the water content of cataractous and normal human lenses was evidently made first by Deutschmann[1] some 60 years ago. He estimated the average water content of six cataractous lenses, removed from patients aged 49 to 70 years, to be 76.8 percent, whereas that of five normal lenses, from patients aged 32 to 63 years, amounted to 68.7 percent. On the basis of these findings, Deutschmann formulated a theory regarding the formation of cataract that is in agreement with certain phases of the most recent theories. His treatise, however, made little impression on ophthalmologists of his time; in fact, it was severely criticized, especially by Hess[2] in a monograph entitled "Pathologie und Therapie des Linsensystems," in which attention was drawn to the small number of lenses examined and to certain flaws in technique. Some 25 years later, however, Deutschmann's results were partially corroborated by Salffner's[3] experiments on naphthalene cataracts in rabbits: in the incipient stage he found that the specific gravity of the cataractous lens decreased by 0.0065 to 0.0129, while in the final stage, during the period of resorption, the specific gravity increased by 0.0120. In 1913 Jess[4] carried out an extensive study of the water content of normal ox lenses, and incidentally determined the water content of a few cataractous lenses from the same type of animal. The senile cataractous lenses were obtained from six animals, aged 11 to 15 years, two of which had bilateral cataracts. Seven other animals, aged 3.5 to 15 years, had unilateral traumatic cataracts. All the senile cataracts showed a decrease in the water content as compared with normal bovine lenses. In the traumatic cataracts, however, there was a slight increase in the water content. Later experiments by other investigators on human crystalline lenses failed to confirm the results obtained by Jess, and his conclusions have been regarded erroneous on account of the small number of analyses. Kubik[5] in 1930 analyzed a large number of human cataractous lenses and showed that the variation in water content is extremely great, both in the direction of high and low values. It may be that the bovine cataractous lenses analyzed by Jess might just have happened to fall within the lower limits of values. Another possibility may be that the cataract in the bovine lens, on account of its rapid growth, its enormous size, its thicker capsule, and other structural and physiological differences as compared with the human lens, develops within a totally different sphere of influences than that of the human lens. Much more investigation of the cataracts in bovine lenses is needed.

In the human cataractous lens, it is certain that there is a definite tendency for the water content to increase as compared with the normal lens, and the increase is proportional to the stage of the cataract. Kubik, who analyzed 260 lenses extracted by the intracapsular method, found the average water content of 12 hypermature cataracts to be 77.8 percent, that of 52 mature cataracts 74.5 percent, and that of 98 immature cataracts 71.3 percent, as compared with 66.2 percent from 26 incipient cataracts. The ranges of variation for these different groups

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were 69.6-86.0, 61.3-85.2, 58.6-85.3, and 57.2-74.5 percent, respectively. He analyzed only three clear lenses and found the average water content to be 67.4 percent, with a range of variation between 66.2 and 68.8 percent. Likewise, other types of cataracts showed an increase in the water content, two diabetic cataracts having the highest average; that is, 80.5 percent. A further confirmation of this tendency came from Cahane[6] who, in an analysis of lenses from subjects of the same approximate age, obtained an average water content of 69.2 percent from two cataractous lenses, and an average of 64.0 percent from two normal lenses. Lebensohn,[7] who determined the water content of a number of cataractous lenses extracted by the intracapsular method, found an average of 76 percent, or a value similar to that found by Kubik for hypermature cataracts.

In the clinical study of the lens, two types of pathologic change have been emphasized; namely, cataract and sclerosis. The attention of investigators so far has been directed chiefly to cataract; sclerosis, or nuclear hardening, has been considered more or less a normal change, determined largely by age. In two previous publications[8, 9] it was pointed out that we may speak of normal and pathologic sclerosis, and that the latter predominates in more advanced types of sclerosis and, as a rule, is then intimately connected with other changes in the lens, such as cataract. It was also suggested that pathologic sclerosis is not the consequence of an abnormal deposition of solids, but that it is brought about by the decomposition of the complex colloidal elements into their soluble and insoluble constituents. A highly sclerosed lens, as a rule, is also associated with advanced cataract, and the affected parts of the lens resemble then an old, hard-fibered sponge with spaces, vacuoles, or lacunae between the fibers, containing free water or fat globules or other fluid substances. As a further consequence of the decomposition of the lens elements into smaller and smaller particles, a molecular imbibition of water from the surrounding aqueous and vitreous humors follows, resulting in an increased water content of the cataractous as well as of the pathologically sclerosed lens. Some indirect evidence for such a possibility was already presented in connection with the study of the lipid constituents of cataractous and sclerosed lenses.[8, 9]

In the present study an attempt was made to ascertain the true state of affairs by direct estimation of the water content of cataractous and sclerosed lenses.

All lenses were studied clinically with the biomicroscope and then extracted by the intracapsular method. Each lens was placed on a small piece of filter paper of known weight and weighed on a sensitive chemical balance immediately after extraction. It was crushed into a thin layer between the folded filter paper by means of a porcelain spatula, dried to constant weight (at a temperature of 100°C. for some 20 hours) in an electric oven and again weighed. The water content was computed from the difference between the two weights.

When the lens was crushed on the filter paper following the first weighing, it was carefully examined also with respect to its state of sclerosis, this being determined by the procedure described in a previous publication.[8]

The water-content determinations are presented in three tables: 1. with respect to cataract, 2. with respect to sclerosis, and 3. with respect to age.

The results in table 1 represent the averages from 138 cataractous lenses, 104 of which were incipient, 13 intumescent, and 21 mature cataracts. The water content of the lenses with incipient cataract

averages 66.0 percent, whereas that of the lenses with intumescent and mature cataracts averages 74.5 and 73.2 per cent, respectively. These data corroborate the findings of Deutschmann, Kubik, Cahane, and Lebensohn.

As the cataract matures, in contrast to the increased water content, there is a decrease in solid constituents. The solids in incipient cataracts average 69.6 mg. per lens, decrease to 58.0 mg. in the intumescent stage, and further decrease to 48.4 mg. in mature cataracts. At the same time there is considerable increase in the absolute amount of water in intumescent as compared with incipient cataracts, the average values being 168.9 and 139.7 mg., respectively. Mature cataracts, on the other hand, show a marked loss in the absolute amount of water, this having suddenly decreased even below that of incipient cataracts, with an average of only 133.5 mg. per lens. But the solids are lost much more rapidly than the water, with the result that the percentage of water of the mature cataracts (73.2 percent) is still considerably higher than that of incipient cataracts (66.0 percent) and only slightly lower than that of intumescent cataracts (74.5 percent). Incidentally there is also an abrupt fall in the average weight of the lens; that is, 0.1819 gm. as compared with 0.2269 gm. for intumescent and 0.2057 gm. for incipient cataracts.

The data in table 2 represent the averages from 166 lenses. Of these, 24 were "practically normal" with respect to sclerosis, 44 showed only slight sclerosis, 39 had pronounced sclerosis, 37 had very pronounced sclerosis, and 22 were in a highly advanced stage of sclerosis.

The average water content of lenses without noticeable sclerosis is 65.1 percent; this is comparable with that of lenses with incipient cataracts (66.0 percent). The next two stages (slight sclerosis and pronounced sclerosis) are much alike with respect to water content, their respective averages being 68.9 and 68.2 percent. Organically or intrinsically, therefore, these two stages represent only one stage. Likewise the last two stages (very pronounced sclerosis and highly advanced sclerosis), on account of the similarity in their water contents (72.3 and 70.0 percent), represent actually one prolonged stage. These two final stages in sclerosis correspond, therefore, with respect to autolysis, to cataractous changes in the intumescent stage (74.5 percent) and more so in the mature stage (73.2 percent).

The two intermediary stages of sclerosis do not have a corresponding characteristic stage in cataract development.

TABLE 1

WATER CONTENT AND SOLIDS OF CATARACTOUS HUMAN LENSES
(Minimum, maximum, and average values)

Stage	No. of Lenses	Age of Patient	Duration Years	Weight Gm.	Mg. of Solids per Lens	Mg. of Water per Lens	Percentage of Water
Incipient	104	48–87	0.33–15.00	0.1470–0.2817	43.2–94.4	95.0–206.2	57.5–78.9
averages		67.8	2.7	0.2057	69.6	139.7	66.0
Intumescent	13	59–79	1.00–10.00	0.1752–0.2932	34.0–74.7	113.1–234.0	64.5–87.1
averages		69.7	3.0	0.2269	58.0	168.9	74.5
Mature	21	48–82	1.00–10.00	0.1450–0.2404	33.2–69.6	101.7–192.9	60.1–84.4
averages		69.0	3.7	0.1819	48.4	133.5	73.2

These two stages in the development of sclerosis must therefore be placed somewhere between the incipient and intumescent stages and must be characteristic of the transition stage from the one into the other. This period can be also designated as an "incubation period" during which the most intense biochemical changes take place without being at once followed by gross physical displacements in the structural elements. These hidden chemical processes must therefore be confined chiefly to the more or less solid nucleus and must consist in the breaking down of the relatively large complex primary molecules of the lens tissue, such as the cholesterol-proteins, lecitho-proteins, and lecithocholesterol, and the liberation of such insoluble substances as the albuminoids and cholesterol. Preceding this "incubation period" there is apparently little additional impairment of the lens. An incipient cortical cataract would largely remain as such and never reach the stage of intumescence and maturity if it were not for these hidden undermining chemical processes in the nucleus. And if in some way these chemical processes within the nucleus, affecting preëminently the phospholipid molecule, could be prevented or arrested, mere cortical opacities would probably in time clear up under a continuous improvement in general well-being.

The two last stages in sclerosis, as indicated in table 2, which correspond to the intumescent and mature stages of cataract, represent a period of a more complex autolytic activity. The sudden increase in water content of the lens shows that the process of decomposition of the primary molecules has been reinforced now by a similar process in the resulting secondary fragments, thus augmenting the number of particles within the lens and thereby increasing its molecular imbibition of water. This eventually results in gross physical displacements and distortions in the structural elements, leading to cataract, nuclear haze, and other changes.

The gradual increase in the percentage of water in the lens with advancing sclerosis is brought about by imbibition of extra water from the surrounding humors as well as by the loss in solids (see table 2). Thus the average absolute amount of solids per lens of practically normal lenses

TABLE 2

WATER CONTENT AND SOLIDS OF SCLEROSED HUMAN LENSES
(Minimum, maximum, and average values)

Stage*	No. of Lenses	Age of Patient	Duration Years	Weight Gm.	Mg. of Solids per Lens	Mg. of Water per Lens	Percentage of Water
0	24	48–80	0.33–15.00	0.1524–0.2611	57.7–86.7	95.0–174.4	62.2–68.7
Averages		65.0	2.6	0.2039	73.4	130.5	65.1
+	44	50–79	0.50–10.00	0.1450–0.2932	34.3–85.9	100.3–218.5	57.5–76.3
Averages		65.6	2.9	0.2045	65.2	139.3	68.9
++	39	58–87	1.00–6.00	0.1516–0.2782	37.6–94.4	103.0–183.8	59.6–79.2
Averages		70.8	3.0	0.2054	65.1	104.3	68.2
+++	37	48–82	1.00–12.00	0.1470–0.2817	34.0–82.7	99.0–206.2	64.0–87.1
Averages		68.4	3.4	0.2033	55.7	147.6	72.3
++++	22	61–80	1.00–10.00	0.1408–0.2483	33.2–81.1	101.7–168.3	61.5–80.5
Averages		71.6	4.6	0.1969	59.6	137.3	70.0

* 0 indicates "practically normal" lenses; +, slight sclerosis; ++, pronounced sclerosis; +++ very pronounced sclerosis; ++++, highly advanced sclerosis.

is 73.4 mg. It decreases to 65.2 and 65.1 mg. during the two intermediary stages, and to 55.1 and 59.6 mg. during the last two stages. At the same time there is an increase in the absolute amount of water up to the last stage, keeping the average weight of the lens practically constant throughout (0.2033-0.2054 gm.) and preserving more or less its normal shape and size. Thus for the "practically normal" lens the absolute amount of water averages 130.5 mg. During succeeding stages of sclerosis the absolute water content increases to 139.3, 140.3, and 147.6 mg. There is then an abrupt fall in the water content, averaging only 137.3 mg. per lens for the last stage. This sudden decrease evidently indicates a breaking down of the resistance of the capsule, permitting water, at this advanced stage of both sclerosis and cataract, to escape from the lens. Consequently, the average weight of the lens likewise decreases (0.1969 gm.).

It is clear from the foregoing that the most critical point in pathologic changes in the lens is reached immediately after the intumescent stage from the standpoint of cataract development, and immediately after the fourth stage from the standpoint of sclerosis. Up to this point the different pathologic changes are confined to the lens mass within the capsule and are effectively resisted by the capsule. But finally the latter also begins to yield under the increasing intralenticular pressure. The damage done to the capsule probably lies chiefly in its loss of vitality and consequently also in an increased permeability, intensified further by prolonged constant stretching.

The capsule is the most inert, keratinous, and compact part of the entire lens and is able to resist effectively not only intense physical strains but also chemical and bacteriologic attacks. Some years ago a number of bovine lenses were kept for more than three months in calcium-chloride solutions of different concentrations, ranging between 0.1 and 1.0 percent, and containing thymol as a preservative. During this period the entire lens mass inside the capsule had changed into a white, brittle, coagulum, whereas the capsule had remained practically unaffected, losing only little of its former transparency, compactness, and flexibility. In explaining cataract, its origin has been almost invariably sought in an increased permeability of the capsule. In the light of the foregoing discussion, serious changes in the permeability of the capsule, preceding abnormal changes within the lens, are highly improbable. So also Leinfelder and Kerr,[10] who produced various lens opacities in rabbits following roentgen-ray irradiation, never observed any changes in the lens capsule. The first clinical indication of lens damage, according to their report, consisted in the appearance of fine vacuoles under the posterior and, more rarely, under the anterior capsule. In senile cataracts, similarly, vacuoles or liquid spherocrystals have been observed, and some of these structures have been identified as myelins or fat droplets (Mettenheimer, Toufesco, Hoffman, Vogt, Busacca, Kranz, Metzger).[11] And in connection with the recent studies on the lipid constituents of cataractous lenses evidence was given that the first changes in the lens substance, leading to clinical symptoms, consist probably in the decomposition of such complex molecules as the cholesterol-lecithin, lecitho-proteins, and cholesterol-proteins. Such changes can be brought about readily within the lens mass, without any changes in the capsule, by such agents as infrared and ultraviolet radiations, various dietary deficiencies, toxins liberated during severe and prolonged general diseases, or even serious changes in the osmotic relationships. Even such exchanges of water and solids as are indicated by the imbibition of the one and the loss of the other across the capsular membrane, during the early intumescence

and the first two or three stages of sclerosis, can be carried on with a normal capsule. That the normal capsule is no hindrance to the passage of relatively large molecules, such as hemoglobin or those of certain dyes, has been already demonstrated by the studies of Hess,[12] Friedenwald,[13] and Gifford, Lebensohn, and Puntenny.[14] The works of Friedenwald and Gifford et al. have also shown that the permeability of the capsule decreases with advancing age, thus furnishing another discouraging factor in attributing senile cataract to previously increased permeability of the capsule.

The data in table 3, in which the lenses are grouped according to age in decades, show that age in the latter part of life—that is, within the range of 49 and 84 years—has only a slight influence on the relative water content of the lens, the increase during this period being from 66.0 to 68.6 percent. There is, however, with advancing age, a perceptible increase in the absolute amount of water within the lens. The average absolute amount of water from six lenses in the fifth decade is 116.8 mg. per lens. It increases to 124.0 mg. for 23 lenses in the sixth decade, to 140.9 mg. for 61 lenses in the seventh decade, and to 142.4 mg. for 62 lenses in the eighth decade. The average amount of water per lens for the ninth decade is only 137.3 mg. But this value was obtained from only four lenses, and therefore can not be regarded as a representative average. The absolute amounts of solids, however, vary less perceptibly and regularly, and their changes, between the limits of 57.9 and 66.8 mg., bear practically no correlation to age. Due to this increase in the absolute amount of the water with advancing age, the average weight of 0.1747 gm. per lens in the fifth decade is increased to 0.1880 gm. in the sixth decade, and to 0.2018 and 0.2092 gm. in the seventh and eight decades. The average weight per lens in the ninth decade is, however, only 0.1997 gm., but on account of the small number of lenses (only four) in this group this again can not be regarded as a representative average.

In all three tables, the approximate durations of visual loss are given in terms of years, and were obtained from the patients' histories. The average duration of incipient cataract is 2.7 years and of intumescent and mature cataracts 3.0 and 3.7 years, respectively. When correlated with the progress in sclerosis, there is a similar steady increase in the time element; that is, an increase from an aver-

TABLE 3

WATER CONTENT AND SOLIDS OF CATARACTOUS HUMAN LENSES ACCORDING TO AGE
(Minimum, maximum, and average values)

Age Decade	No. of Lenses	Age of Patient	Duration Years	Weight Gm.	Mg. of Solids per Lens	Mg. of Water per Lens	Percentage of Water
V	6	48–50	2.00–6.00	0.1450–0.2171	34.3–92.3	100.8–131.8	57.5–77.8
Averages		49.2	3.7	0.1747	57.9	116.8	67.6
VI	23	52–60	0.33–6.00	0.1470–0.2513	46.6–86.4	95.0–169.9	61.6–79.2
Averages		57.3	2.5	0.1880	64.0	124.0	66.0
VII	61	61.0–70.0	1.00–7.00	0.1516–0.2932	33.2–86.7	103.8–234.0	60.1–84.4
Averages		66.2	2.8	0.2018	60.9	140.9	67.8
VIII	62	71.0–80.0	1.00–15.00	0.1408–0.2817	34.2–85.9	101.4–206.2	59.2–80.5
Averages		74.9	3.5	0.2092	66.8	142.4	68.3
IX	4	81–87	3.00–6.00	0.1873–0.2146	55.1–73.0	123.6–149.9	62.2–71.7
Averages		84.2	5.3	0.1997	62.4	137.3	68.6

age of 2.6 years for the first stage to 4.6 years for the last stage. Similar figures have been obtained also in all previous studies. This shows that these duration estimates as obtained from the patients are not so hopelessly inaccurate as it has been generally assumed, and deserve more serious consideration in the study of the disease. When referred to the age of the patient (table 3), the duration estimates appear to have no significance, as may be expected.

Summary

A total of 167 pathologic human lenses were analyzed for water content. All lenses were studied with the biomicroscope and later extracted by the intracapsular method. Following extraction, the stage of sclerosis was ascertained macroscopically by the procedure described in a previous publication.

The average amount of water per lens for incipient cataracts is 139.7 mg. During the stage of intumescence the absolute amount of water in the lens increases to 168.9 mg.; that is, by nearly 21 percent. However, during the stage of maturity, due to serious damage to the capsule, it falls again to the low level of 133.5 mg., or 26 percent below that for intumescent and nearly 5 percent below that for incipient cataracts. On the other hand, a marked loss in solids is registered throughout the entire development of the cataract up to maturity. The solids for incipient cataracts average 69.6 mg. per lens, and during the stages of intumescence and maturity they decrease to 58.0 and 48.4 mg.; that is, by 20 percent and 44 percent, respectively, as compared with incipient cataracts. When the water content is expressed in terms of percentage, incipient cataracts have an average of 66.0 percent, intumescent cataracts 74.5 percent, and mature cataracts 73.2 percent. Due to these changes in the relationship between water content and solids, the three different groups of lenses show also corresponding changes in weights. The average weight of the lens with incipient cataract amounts to 0.2057 gm.; it increases to 0.2269 gm. during the stage of intumescence, but finally decreases to 0.1819 gm. during the stage of maturity.

Similar relationships between changes in the water content and solids are found also in sclerosed lenses. The absolute water content for lenses with no perceptible sclerosis averages 130.5 mg. per lens. During the next three stages it increases to 139.3, 140.3, and 147.6 mg. per lens, and during the next and last stage it decreases to 137.3 mg. per lens. On the other hand, the solids decrease somewhat proportionally, that is from an average of 73.4 mg. per lens in practically nonsclerosed lenses they drop to the following values in the next four stages: 65.2, 65.1, 55.7, and 59.6 mg. per lens. Computed on the relative basis, the water content for "practically normal" lenses averages 65.1 percent. During the two intermediary stages it increases to 68.9 and 68.2 percent, and during the last two stages it increases to 72.3 and 70.0 percent. The average weight of the lens, however, remains practically constant during the entire period of developing sclerosis, thus during the first four stages it maintains its weight between 0.2033 and 0.2054 gm. per lens, and only during the last stage drops to 0.1969 gm.

From the foregoing it is concluded, as expressed in previous publications, that cataract and sclerosis are intimately related in that both are the result of autolysis in the cortex and the nucleus, respectively. Consequently pathologic sclerosis is not the result of an abnormal deposition of solids in the lens, but presents a stage similar to that of an old, hard-fibered sponge with spaces or vacuoles or lacunae between the fibers, containing free water or droplets of fat or myelins.

Pathologic changes within the lens mass do not presuppose necessarily an increased permeability of the lens capsule. Evidence is offered that the capsule is the most resistant part in the entire lens, and is the last to show signs of degeneration under the prolonged stress of ever-increasing intralenticular pressure due to molecular imbibition of water following autolysis. Destructive, pathologic changes can be started within the lens with a perfectly normal capsule by such agents as infrared and ultraviolet radiations, faulty nutrition, electric shock, toxins liberated during a serious protracted general illness, or even serious disturbances in osmotic relationships (especially under experimental procedures).

Between the ages of 49 and 84 years of age, the relative water content increases only slightly and somewhat irregularly with advancing age, the variation being within the narrow limits of 66.0 and 68.6 percent. On the basis of absolute amounts, increase in the water content is more perceptible and regular, and varies between 116.8 and 142.4 mg. per lens. The changes in the absolute amounts of solids under the influence of age are less pronounced and more irregular, and vary between 57.9 and 66.8 mg. per lens. The average weight of the lens, however, due largely to the increase in the water content, is found in this study, as in previous studies, to increase with advancing age.

It is also pointed out that the duration estimates of impaired vision, as stated by patients, are not so hopelessly inaccurate as they have been regarded. The average figures obtained in this study for different types of lenticular changes agree well with those obtained in previous studies, and they agree remarkably well with what one would expect theoretically.

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References

[1] Deutschmann, R. Fortgesetzte Untersuchungen zur Pathogenese der Cataract. II. Cataracta senilis. Arch. f. Ophth., 1879, v. 25 pt. 2, pp. 213-242.

[2] Hess, C. Pathologie und Therapie des Linsensystems. Graefe-Saemisch Handbuch der Augenheilkunde. Ed. 2, 1905, pt. 2, chap. 9, p. 80.

[3] Salffner, O. Zur Pathogenese des Naphthalinstares. Arch. f. Ophth., 1904, v. 59, pp. 520-552.

[4] Jess, A. Beiträge zur Kentniss der Chemie der normalen und der pathologisch veränderten Linse des Auges. Zeit. f. Biol., 1913, v. 61, pp. 93-142.

[5] Kubik, J. Zur Pathologie menschlicher Stare. Zentralbl. f. d. ges Ophth., 1930, v. 23, p. 350.

[6] Cahane, M. Recherches sur la teneur du cristallin en eau et en cholestérol suivant l'age. Cataracte et cholésterol. Compt. rend. Soc. de biol., 1931, v. 108, pp. 992-993.

[7] Lebensohn, J. E. The biochemistry of the lens. III. Water equilibrium in the normal and cataractous lens. Amer. Jour. Ophth., 1933, v. 16, pp. 1062-1075.

[8] Salit, P. W., Phospholipid content of cataractous and sclerosed human lenses. A biochemical study of lenticular changes. Arch. of Ophth., 1936, v. 16, pp. 271-283.

[9] ———. Total lipids of human cataractous and sclerosed lenses. Amer. Jour. Ophth., 1937, v. 20, pp. 157-165.

[10] Leinfelder, P. J., and Kerr, H. D. Roentgen-ray cataract. Amer. Jour. Ophth., 1936, v. 19, pp. 739-756.

[11] Salit, P. W. Phospholipid content of cataractous human lenses. Brit. Jour. Ophth., 1935, v. 19, pp. 663-671.

[12] Hess, C. Pathologie und Therapie des Linsensystems. Graefe-Saemish Handbuch der Augenheilkunde. Ed. 3, Leipzig, Wilhelm Engelmann, 1911, v. 6, pp. 35-49.

[13] Friedenwald, J. S. Permeability of the lens capsule. With special reference to the etiology of senile cataract. Arch. of Ophth., 1930, v. 3, pp. 182-193; The permeability of the lens capsule to water, dextrose and other sugars. Ibid., v. 4, pp. 350-360.

[14] Gifford, S. R., Lebensohn, J. E., and Puntenny, I. S. The biochemistry of the lens. I. The permeability of the capsule of the lens. Arch. of Ophth, 1932, v. 8, pp. 414-440.

SULFANILAMIDE IN GONORRHEAL OPHTHALMIA*

Preliminary report

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In December, 1936, we reported the results obtained in a series of cases of gonorrheal ophthalmia treated with parenteral milk injections, frequent irrigations, and local antiseptics.[1] This treatment was found to be very satisfactory in ophthalmia neonatorum and in all those cases in which a genital gonorrheal infection had preceded the ocular disease, but was of little value in primary ocular infection. Of the 14 cases included in this series, 12 were of the secondary type, and in all of them useful vision in the affected eye was retained, eight of them healing without corneal complication. The other two were of the primary type and both had extensive corneal involvement, necessitating evisceration in one case and resulting in a total leucoma in the other.

Last July, prompted by the encouraging reports appearing in the literature[2] on the use of sulfanilamide in gonorrheal urethritis and arthritis, we began to use this drug in gonorrheal ophthalmia. The results obtained in the first eight cases treated have been so convincing that we have deemed it justifiable to present this preliminary report, although the number of cases treated is yet too small to establish definitely the clinical value of the drug in this condition.

Clinical procedure

Diagnosis. This was established in all cases by the clinical picture and the presence of the gonococcus in the exudate stained by Gram's method. Cultures were made in a few cases only.

Treatment. All of the patients treated were adults, and each had only one eye affected. None developed infection in the other eye. All were treated in the dispensary without hospitalization.

A daily dose of 2.6 gm. was regularly employed during the first three days, divided into four doses of 0.65 gm. at 8 a.m., 1 p.m., 6 p.m. and 11 p.m. On the fourth day we instituted a daily dose of 1.95 gm., administering 0.65 gm. at 8 a.m., 3 p.m., and 10 p.m. In two cases, a dose of 3.90 gm. was given during the first three days, 2.6 gm. the next three days, and finally, 1.95 gm. daily, as in the other cases. One of these patients, who weighed only 100 pounds, complained of a slight dizziness during the first three days, but had no other untoward symptoms. These doses are smaller than those regularly employed in the treatment of other conditions with the drug.[2]

We began cautiously, using the drug as an adjuvant to our previous method of treatment. In our first case we administered a milk injection of 5 c.c., intramuscularly, and the usual local treatment on the first day, then started with sulfanilamide on the second day, giving 1.95 gm. daily. Improvement was so notably rapid that it had to be attributed to the addition of the drug; so we gave no more milk injections, but continued with sulfanilamide and local treatment. On the fourth day after the administration of only 7.80 gm. of the drug, the progress of infection was definitely checked. On the sixth day, as the gonococcus was still present in the conjunctival scrapings and

* From the Puerto Rico Institute of Ophthalmology. Read before the annual meeting of the Puerto Rico Medical Association, December 17, 1937.

TABLE 1

TABULATED RÉSUMÉ OF CASES TREATED

Case No. and Initials	Extraocular Gonococcic Infection	Date of Onset of Ocular Symptoms	Administration of Sulfanilamide	Treatment other than Sulfanilamide	Clinical Progress	Date of Negative Smear	Complications	Final Outcome and Duration of Treatment
1 A. R. O.	Urethritis 20 days' duration	7/15/37	7/17/37 to 7/25/37 19.5 gm.	Intramuscular milk injection 5 c.c., boric-solution irrigation q. 2 hr., mercurochrome 2% q. 4 hr., argyrol 25% once daily	7/20 secretion diminished. 7/21 chemosis and edema gone.	7/26/37	None	7/30/37 completely well. V. = 20/20. 13 days. (Urethritis clinically cured)
2 I. V. M.	Cervicitis 6 months' duration	7/17/37	7/19/37 to 7/31/37 22.75 gm.	Boric-solution irrigation and mercurochrome 2% q. 4 hr., argyrol 25% once daily	7/26 less edema, abundant secretion.[1] 7/29 no edema, scanty secretion. 8/2 no secretion	8/ 2/37	Slight marginal ulceration of cornea.[2]	8/9/37 well. V. = 20/20. Small peripheral corneal opacities. 21 days
3 J. G. C.	None	7/21/37	7/27/37 to 7/30/37 13.65 gm.	Protargol 5% on first day; boric irrigation and mercurochrome 4% q. 4 hr. to 8/2/37	7/29 secretion diminished. 7/30 suppuration stopped	8/ 2/37	None	8/4/37 well.[3] 9 days
4 J. R. O.	Urethritis 2 weeks' duration	8/11/37	8/13/37 1.95 gm.[4]	Protargol 5% once	8/14 edema and suppuration diminished	—	—	Abandoned treatment
5 J. P. S.	Urethritis 8 months' duration	8/14/37	8/16/37 to 8/23/37 15.6 gm.	Normal saline irrigations q. 3 hr.	8/19 edema disappeared, scanty secretion. 8/21 suppuration stopped	8/23/37	None	8/28/37 completely well. V. = 20/20. 12 days
6 C. M. A.	Urethritis 3 years' duration	8/22/37	8/24/37 to 8/30/37 22.425 gm.	Normal saline irrigations q. 3 hr.	8/25 edema and secretion greatly diminished. 8/26 very scanty secretion. 8/28 no secretion	8/28/37 Positive culture[5]	Slight dizziness first 2 days	9/1/37 clinically well. V. = 20/20. 8 days
7 R. C. R.	None	10/19/37	10/20/37 to 10/29/37 16.25 gm.	None	10/21 chemosis and secretion diminished. 10/22 chemosis gone, scanty secretion. 10/23 reappearance of chemosis and abundant secretion. 10/24 chemosis gone, scanty secretion. 10/29 no secretion.	11/12/37[6]	Setback on third day due to temporary stopping of sulfanilamide	11/6/37 clinically well. V. = 20/20[6]. 17 days
8 J. N. S.	Urethritis of uncertain duration	11/10/37	11/12/37 to 11/20/37 20.15 gm.	None	11/13 chemosis and secretion greatly diminished. V. = 20/20. 11/15 chemosis gone, scanty secretion. 11/17 no secretion	11/22/37	None	11/22/37 well. V. = 20/20. 10 days

[1] This patient took sulfanilamide irregularly during the first 8 days; after this, followed treatment regularly.
[2] Complication attributed to the irregularity of treatment during the first 8 days.
[3] In this case infection occurred in the cavity of an eye enucleated years previously.
[4] This patient abandoned treatment on the second day; some improvement was already noticeable.
[5] Failed to return for last smear.
[6] Smear on Nov. 2d showed few gonococci, but patient did not return until Nov. 12th, when smear was negative.

the patient had not shown any ill effects from the drug, we increased the dose to 2.6 gm. daily during the next three days, at the end of which time the eye was completely well, except for slight residual hyperemia of the conjunctiva, and no gonococci were present in the smear and culture.

In the next three cases no milk injections were used, and only mild local treatment was employed in addition to the sulfanilamide. Our results were as highly satisfactory as those obtained with the previous method.

Discussion

The mode of action of sulfanilamide is not as yet clearly known. It has been proved that the drug produces bacteriostasis in streptococcus[3, 4] and extraocular gonococcus infections[2] when certain blood concentrations are attained. We have observed that the gonococcus persists in the conjunctiva after the disappearance of clinical manifestations, both during and after administration of the drug. In case 7 a recrudescence of the clinical signs was observed, on stopping the drug on the third day when the infection appeared to be clinically subdued, and then rapid recovery upon resumption of the administration of sulfanilamide. It has been shown by the investigations of Mellon and others,[4] Bliss and Long,[3] and Dees and Colston,[2] that phagocytosis plays no part in the action of sulfanilamide, and this is clearly evident in gonorrheal ophthalmia, where the secretion rapidly disappears on administration of the drug.

With these points in mind, we are inclined to believe that in gonorrheal ophthalmia, sulfanilamide acts by producing a bacteriostasis which holds the organisms in check while the local and general defense mechanisms of the body are mobilized against the infection. This may explain why there is no reappearance of clinical manifestations when the drug is stopped, even though the gonococci still linger on the conjunctiva—a defense which they cannot overcome has been or-

Fig. 1 (L. J. and R. Fernández). The condition of the eye in case 7: on the first visit, after 24 hours, on the eighth day, and on the twelfth day.

The next two patients were given sulfanilamide and normal saline irrigations, with equally encouraging results.

The last two patients were treated exclusively with sulfanilamide without any local treatment. The results were as rapid and remarkable as in the former cases, which tends to show that this drug is, in itself, capable of combating this malady.

The patient in case 2 took the sulfanilamide irregularly the first seven days and had a slight peripheral ulceration of the cornea, which delayed recovery. In case 7 a set-back (increased suppuration and reappearance of conjunctival chemosis) occurred on the third day, when the drug was temporarily stopped, but on resuming it the patient rapidly recovered and was completely well in a few more days (fig. 1). One of the patients abandoned treatment after taking only 2.6 gm. of the drug in the first 24 hours; some improvement was already evident.

this case infection occurred in the cavity of an eye enucleated years previously.
The patient abandoned treatment on the second day; some improvement was already noticeable.
Failed to return for further observation.
Smear on Nov. 2d showed few gonococci, but patient did not return until Nov. 12th, when smear was negative.

ganized. It also explains why in case 7 there was a set-back on prematurely discontinuing the drug on the third day—the defense mechanisms had not had time to be duly organized.

Summary and conclusions

1. All patients who received sulfanilamide recovered in a spectacular manner and in a shorter period of time than that required by other accepted forms of treatment.

2. Cases of primary eye infection, where no preëxisting focus of gonorrheal infection could be demonstrated, responded as well as those of secondary eye infection. We must emphasize that these cases of primary infection of the eye failed, as a rule, to respond to any other type of treatment hitherto employed.

3. The results obtained in this series of cases warrant the judicious use of sulfanilamide in all cases of gonorrheal ophthalmia in adults, whenever there is no serious contraindication.

4. It is highly desirable that this method of treatment be tested by our colleagues to corroborate our findings.

5. The mode of action of this drug needs more thorough investigation. We have only checked our clinical findings by routine laboratory examinations (smears and cultures), but it is yet necessary to determine the minimal effective dose.

6. We have had no opportunity to treat ophthalmia neonatorum by this method, but see no reason why it should not be as effective as in adults.

7. Smaller doses and special precautions must be used for patients with renal insufficiency, because the excretion of sulfanilamide is slow, and in such patients would tend towards accumulation of the drug in the blood.[5]

Bibliography

[1] Fernández, R. F. Apuntes sobre el tratamiento de la oftalmia gonococica. Bul. Asoc. Méd. de P. R., 1937, v. 29, no. 6, p. 283.

[2] Dees, J. E., and Colston, J. A. C. The use of sulfanilamide in gonococcic infections. Jour. Amer. Med. Assoc., 1937, v. 108, p. 1855.

[3] Bliss, E. A., and Long, P. H. Observations on the mode of action of sulfanilamide. Jour. Amer. Med. Assoc., 1937, v. 108, p. 1524.

[4] Mellon, R. R., et al. Experimental studies with sulfanilamide and prontosil in hemolytic streptococcus infections. Jour. Amer. Med. Assoc., 1937, v. 108, p. 1858.

[5] Marshall, E. K., et al. Para-aminobenzenesulfonamide, absorption and excretion: Method of determination in urine and blood. Jour. Amer. Med. Assoc., 1937, v. 108, p. 953.

RETINAL CHANGES IN HYPERTENSIVE TOXEMIA OF PREGNANCY*

A REPORT OF 47 CASES

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Retinal changes associated with hypertensive toxemia of pregnancy have been studied and reported within recent years by Wagener,[1] Masters,[2] Hallum,[3] and others. These studies were made in an attempt to evaluate the importance of retinal changes with respect to the diagnosis, prognosis, and management of such cases. The present report is an added effort along similar lines.

It goes almost without saying that routine studies of the ocular fundi should be made in every case of hypertensive toxemia of pregnancy, since changes in the retinal arterioles and in the retina itself are common and oftentimes serve as a guide to prognosis and management.

The diagnosis of hypertensive toxemia of pregnancy, as a rule, rests on three findings—elevation of the blood pressure, albuminuria, and edema; however, one of the latter two may be absent. To these important signs should be added angiospasm or angiosclerosis of the retinal vessels and retinitis.

Visible changes in the retinal arteries and arterioles are not seen during the course of a normal pregnancy; however, with the onset of hypertension and other signs of toxemia, constriction of the retinal arterioles appears in a large percentage of cases. The vascular construction is undoubtedly spastic in the early stages of toxemia but, later, organic changes in the vessel walls develop, signs of angiosclerosis appear, and, eventually, in the more severe cases, retinitis develops. In the beginning angiospasm may be general or, less frequently, it may be confined, at least for a time, to localized arterioles or even restricted to localized areas in individual vessels. However, if the toxemia persists, generalized angiospasm and, later, angiosclerosis develop. In more severe cases of toxemia, retinal edema, hemorrhages, areas of cytoid, and hyaline or colloid degeneration may appear, also an occasional retinal detachment. Such retinal changes are usually confined to the posterior segment of the fundus.

Over a period of 21 months, 2,365 indigent pregnant women were admitted to the obstetrics service at the University Hospital in Iowa City, and the condition of 47 among them was diagnosed as hypertensive toxemia of pregnancy. Diagnosis of toxemia was made by the obstetricians if the patient had a systolic blood pressure of 150 mm. of mercury or over, albuminuria of 1 gram per liter per 24 hours (Esbach), and definite pitting edema. In an occasional case, one of the two latter signs was absent. The fundi of these patients were examined repeatedly, both before and after delivery of the fetus, and again four months after their discharge from the hospital.

An additional 98 cases were admitted to the hospital with a mild grade of toxemia; that is, a systolic blood pressure of less than 150 mm. of mercury, slight traces of albumin in the urine, and questionable edema. There were no fundus changes in any of this group. On bed rest, a special diet, limitation of fluids, and elimination, all of these patients improved and went through the remainder of their pregnancy in a normal manner.

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Age. The ages of the 47 patients with toxemia ranged from 17 to 45 years, inclusive, thus covering almost the entire child-bearing period. Five patients were under 20 years of age and 12 were over 35 years old.

Previous pregnancies. There were 16 primapara (34 percent), 17 multipara (36 percent) who had borne from 1 to 5 children, and 14 multipara (30 percent) who had each borne more than 5 children.

Previous toxemia or nephritis. One patient who had borne 5 children gave a history of mild toxemia during the third trimester of her last pregnancy, and a questionable history of a similar complication was obtained from another patient with 3 previous pregnancies.

There was a history of nephritis in 2 multipara, one of whom had given birth to 7 children, and the other to 8 children.

Stage of pregnancy. One patient with a hydatiform mole and hypertensive toxemia was in the first trimester, 5 (11 percent) were in the second trimester, and 41 (87 percent) were in the third trimester. Signs of toxemia appeared as follows:

Month of pregnancy	1st	2d	3d	4th	5th	6th	7th	8th	9th
Number of cases	0	0	1	0	1	4	6	8	27

Blood pressure. Forty-five (96 percent) of the 47 patients had a systolic blood pressure of over 150 mm. of mercury (minimum 150, maximum 240). The systolic pressure in 28 of these cases ranged between 150 and 180 mm. of mercury, and in 17 cases between 185 and 240 mm. of mercury. The diastolic pressure, for those with a systolic range between 150 and 180, ran from 92 to 130 mm. of mercury, and for those with a systolic range of 185 to 240, from 105 to 160 mm. of mercury. One patient, aged 17 years, had a blood pressure of 140/108. Another, with a pressure of 138/79, had the hydatiform mole and was extremely anemic as a result of severe hemorrhage. She, however, had had a systolic pressure of 180 before the onset of hemorrhage.

Albumin. Examination of the urine invariably showed albumin.

Albumin	Trace	1+	2+	3+	4+
Number of cases	3(6%)	5(11%)	13(28%)	20(42%)	6(13%)

Casts. Casts were found in the urine in 12 cases (26 percent).

Blood chemistry. The urea nitrogen was definitely elevated in 5 patients (11 percent), and in 2 of these the uric acid was also slightly increased. Creatinine was normal in every case.

Convulsions. In only 2 cases were convulsions seen; one patient was in the second trimester and the other in the early part of the third trimester of pregnancy.

Deaths. There were no deaths in this series of cases.

Fetus. A viable fetus was delivered in 31 instances (66 percent) and a dead fetus in 14 (30 percent). One patient had a hydatiform mole, and one left the hospital before delivery.

VISUAL COMPLAINTS.

In only 15 patients (32 percent) were there visual complaints. Nine patients had normal fundi throughout the period of observation, and disturbances of vision were not to be expected. Six patients stated there were spots before the eyes, 4 complained of flashes of light, 2 of failing vision, and 2 of blurred vision; 1 was temporarily blind as a result of a toxic amaurosis which developed the day following delivery.

Fundi. The ocular findings were grouped as follows: (1) normal fundi, (2) angiospasm, (3) angiosclerosis, (4) retinitis, and (5) retinitis and detachment of the retina.

Normal fundi. Nine patients (19 percent) had normal fundi throughout the entire period of observation.

As noted in table 1, the systolic blood pressure in those with normal fundi ranged, with one exception, from 156 to 180 mm. of mercury, the average being 165; the diastolic pressure varied from 92 to 130 mm. of mercury, the average being 109. Albuminuria and edema were rather severe.

At the examination on the ninth post-partum day the blood pressure had invariably dropped to a lower level, the systolic pressure ranging between 120 and 165 mm. of mercury, with an average of 130, and the diastolic pressure varying from 70 to 100 mm. of mercury, with an average of 83. This was to be expected after delivery and a few days of rest in bed.

Six of the nine patients returned, as requested, after four months. The blood-pressure average of 129 mm. of mercury systolic and 80 diastolic was practically the same as at the time of discharge. On the average it was within normal limits; however, in two individual cases there was a tendency to a return of elevated pressure. Perhaps further observation of these two cases might have led to the discovery of signs of angiosclerosis. None of the patients had albumin in the urine at this time.

It appears from the above data that cases of toxemia of pregnancy with normal fundi usually make a complete recovery.

Angiospasm. Angiospasm of the retinal arterioles was observed in 13 cases (28 percent). As a rule, the vascular constriction was general over the fundus, but occasionally localized spasms were seen. The diagnosis of angiospasm, as distinguished from early organic changes, was oftentimes difficult; in the former, only a decrease in caliber of the vessels was seen, the other signs usually associated with angiosclerosis not being observed.

These 13 patients showed retinal angiospasm on admission but no other ocular signs of toxemia. Of the 13 there were 4 with normal fundi at the time of discharge on the ninth post-partum day. Six of the remaining nine returned after four months and, with the exception of one patient who had developed mild angiosclerosis of the retinal arterioles, the fundi were normal. This would lead one to believe that if angiospasm alone is observed and suitable treatment is instituted, the patient almost invariably makes a complete recovery.

TABLE 1

NORMAL FUNDI

On Admission B. P.*			Post partum (9th day) B. P.	After 4 Months B. P.	
Sys/Diast.	Alb.	Edema	Sys/Diast.	Syst/Diast.	Alb.
140/108	1+	3+	120/80	114/72	0
156/102	3+	2+	125/100	118/78	0
160/92	3+	3+	120/70	146/88	0
160/100	4+	3+	125/80	not seen	
165/120	4+	2+	120/75	126/82	0
170/110	2+	3+	125/80	not seen	
176/130	2+	2+	145/100	not seen	
178/100	1+	1+	165/80	148/82	tr.
180/118	4+	4+	125/82	120/80	0

* Blood pressure.

TABLE 2

RETINAL ANGIOSPASM

On Admission B. P.*			Post partum (9th day) B. P.	After 4 Months B. P.	
Sys/Diast.	Alb.	Edema	Sys/Diast.	Sys/Diast.	Alb.
159/95	1+	2+	135/80	128/80	0
150/100	2+	1+	125/90	122/72	0
160/92	3+	3+	150/90**	124/84	1+
160/110	3+	2+	185/100	not seen	
160/100	2+	4+	150/90**	110/74	0
165/105	3+	2+	135/85	126/80	tr.
165/120	3+	2+	125/90	118/78	1+
170/110	1+	1+	140/100	135/90	0
170/110	3+	3+	135/90	not seen	
180/95	2+	1+	170/85	168/90***	1+
190/116	3+	3+	150/80	136/80	2+
190/120	2+	sl.	140/85**	126/78	0
200/135	3+	2+	160/115**	not seen	

* Blood pressure. ** Fundi normal. *** Mild angiosclerosis.

In this group the systolic blood pressure on admission ranged from 150 to 200 mm. of mercury, averaging 170; the diastolic pressure varied from 92 to 135 mm. of mercury, with an average of 108. The average systolic pressure in these cases was very little, only 5 mm. of mercury, above that found in the group with normal fundi, and the diastolic averages were practically the same. On the whole, albuminuria and edema were of approximately the same severity as in the group with normal fundi.

At the examination nine days *post partum* the systolic pressure ranged from 125 to 185 mm. of mercury, with an average of 146, and the diastolic ran from 80 to 115 mm. of mercury, with an average of 91. It is to be noted that the blood pressure in the average case did not return to normal levels so rapidly in these patients as in those with normal fundi, that is, the average systolic pressure was 16 mm. of mercury higher and the average diastolic 8 mm. higher at the postpartum examination—indicating that the angiospasm had not yet subsided.

Ten of the thirteen patients returned after four months, and at this time the average systolic and diastolic blood pressures were the same in the group with angiospasm as in that with normal fundi. This might be expected, since those with angiospasm only had no organic changes in the vessels and presumably had returned to normal. However, at this time, some albumin was found in the urine of five of these patients, an indication of kidney damage—whether it was permanent or not is open to question.

Angiosclerosis. Twelve patients (25 percent) were found to have arteriolar sclerosis on admission to the hospital. The retina in each case was considered otherwise normal even though in two there was questionable edema and in one a minute hemorrhage was found.

At the examination on the ninth postpartum day and again four months after delivery, the fundi showed only angiosclerosis; in not a single case had angiosclerotic or renal retinitis developed. Probably, after a longer period of observation, some of these fundi would have shown signs of retinitis.

In this group the systolic blood pressure on admission ranged from 160 to 240 mm. of mercury, averaging 181, and the diastolic pressure varied from 96 to 160 mm. of mercury, averaging 118. Thus it

TABLE 3

RETINAL ANGIOSCLEROSIS

On Admission B. P.*			Post partum (9th day) B. P.	After 4 Months B. P.	
Sys/Diast.	Alb.	Edema	Sys/Diast.	Sys/Diast.	Alb.
160/100	tr.	2+	180/108	160/90	tr.
160/120**	2+	1+	180/120	154/96	3+
170/110	2+	1+	170/108	146/100	0
170/130**	3+	0	170/110	146/100	0
172/112	3+	1+	160/110	not seen	
174/110	1+	1+	140/110	170/118	0
175/96	2+	3+	185/110	166/90	0
175/120	2+	2+	180/130	170/110	2+
188/105	tr.	2+	160/100	not seen	
190/136***	3+	1+	180/120	162/110	0
200/114	4+	3+	140/95	138/90	1+
240/160	tr.	sl.	170/115	220/160	1+

* Blood pressure. ** Questionable edema. *** One minute hemorrhage.

may be seen that the average blood pressure was much higher than in the groups with normal fundi and angiospasm. With the angiospasm and added organic changes, the blood presure should have been more elevated. Albuminuria and edema were, on the average, a little less severe than in the two former groups; it is difficult to account for such findings.

On the ninth post-partum day, although there was some general lowering of pressure, as might be expected after delivery and several days in bed, the average pressure remained markedly elevated. The minimum systolic pressure at this time was 140 mm. of mercury, the maximum 185, and the average 168; the diastolic ranged from 95 to 130 mm. of mercury, with an average of 111.

At the time of examination of the 10 patients who returned four months later, there was practically no change in the average systolic and diastolic blood pressures from those observed at the post-partum examination. The average systolic and diastolic pressures were 166 and 111 mm. of mercury, respectively. The blood pressure had not receded as it had in those without organic changes in the retina. One might have expected an even higher pressure at this time, since the patients had been up and about their daily tasks, but it was more elevated in only three of the group. Albuminuria had disappeared in 5 of the 10 cases, while in the remaining 5 it was still present.

Retinitis. A diagnosis of retinitis was made when, in addition to organic vascular changes, there were hemorrhages, edema, woolly areas of cytoid degeneration, and, in some cases, sharply marginated areas of hyaline or colloid degeneration. Such changes in the retina were observed in 12 patients (25 percent) on admission to the hospital. Almost invariably, immediately after delivery the patients in this group were observed to have increased hemorrhages and edema, and usually an increase in the number and size of the cytoid areas of degeneration. Oftentimes there was rather rapid improvement, and, after a few days, the edema had disappeared and the hemorrhages and cytoid areas had lessened in size or had vanished. At this time, while every patient showed hemorrhages and areas of cytoid degeneration, hyaline or colloid areas were observed in only two patients, one of whom had an early star figure at the macula. On the ninth post-partum day, the fundi remained unchanged in one patient, five showed some

improvement, and six had grown progressively worse. In three of those whose fundi appeared worse, star figures had developed during the post-partum period. Nine of the patients returned for examination four months after discharge and, at this time, in four there were no signs of retinal involvement other than angiosclerosis, but in the remaining five the retinitis had progressed. Fine granular pigment changes in the retina were observed in several cases at this time, especially in those who had had a pronounced edema or a detachment of the retina.

In this group the systolic blood pressure on admission ranged from 170 to 230 mm. of mercury, averaging 199, and the diastolic ranged from 110 to 160 mm. of mercury, averaging 137. As expected, patients with pronounced arteriolar sclerosis, and resultant higher blood pressure, more often had retinitis. It is known that actual retinitis does not appear with angiospasm, but, after organic vascular changes occur, retinal pathology may follow. It is probable that the areas of cytoid, hyaline, and colloid degeneration follow occlusion of the smaller arterioles. In these patients with retinitis, large amounts of albumin were invariably found in the urine. The edema, however, was not so pronounced as in those with lower blood pressures and fundi that were normal or showed only angiospasm.

At the post-partum examination nine days after delivery, the systolic blood pressure ranged from 120 to 215 mm. of mercury, averaging 166, and the diastolic from 82 to 135 mm. of mercury, averaging 111. The patients had been delivered and placed on bed rest and although the pressure was high it was much lower than that found on admission; it was not lower, however, than that of those in the group with angiosclerosis only.

Nine of the twelve patients returned for examination four months later. The minimum systolic blood pressure was 120 mm. of mercury, the maximum 226, and the average 165; the minimum diastolic pressure was 80 mm. of mercury, the maximum 134, and the average 104. The average amount of albumin in the urine was highest in these cases. By comparison of the data, it is realized that, as a rule, the patients in this group were far more seriously affected than those of any other group. The blood pressure remained at high levels and the prognosis for many of these patients was apparently poor.

The patient with the hydatiform mole was admitted with a severe toxemia of

TABLE 4

RETINITIS

On Admission B. P.*			Post partum (9th day) B. P.	After 4 Months B. P.	
Sys/Diast.	Alb.	Edema	Sys/Diast.	Sys/Diast.	Alb.
170/115	3+	1+	160/105	142/88	tr.
175/120	3+	3+	150/110	not seen	
185/110	3+	2+	160/105	138/84	0
185/138	4+	1+	120/82	120/80	4+
195/140	3+	2+	140/110	128/98	1+
196/130	3+	1+	195/125	210/130	3+
200/144	3+	2+	200/120	176/100	2+
200/150	3+	1+	185/125	not seen	
205/135	3+	1+	125/90	162/98	tr.
220/150	4+	±	215/135	185/120	2+
225/150	2+	2+	170/110	226/134	0
230/160	2+	2+	170/120	not seen	

* Blood pressure.

TABLE 5

DETACHMENT OF RETINA

On Admission B. P.*			Post partum (9th day) B. P.	After 4 Months B. P.	
Sys/Diast.	Alb.	Edema	Sys/Diast.	Sys/Diast.	Alb.
196/130	3+	1+	195/125	210/130	3+
200/150	3+	1+	185/125	not seen	
200/144	3+	2+	200/120	176/100	2+
205/135	3+	1+	125/90	162/98	tr.

* Blood pressure.

pregnancy. The systolic blood pressure had been over 180 mm. of mercury and, on admission, there was a 3+ albuminuria, 1+ edema and many areas of cytoid degeneration in each retina. This case was not included in the above statistics because of uterine hemorrhages and a severe secondary anemia that evidently complicated the picture.

Retinal detachment. Flat detachment of the retina in the region of the macula was observed on admission in three of the cases with retinitis. This detachment was unilateral in two and bilateral in the remaining case. That it was not a simple edema, such as that seen in several patients, was evident from the darkening of the retinal vessels and from the appearance of fine granular pigment after absorption of the underlying fluid. One patient was admitted with a large bullous detachment in each eye.

At the post-partum examination on the ninth day, the flat detachments had disappeared, but in the patient with the large bullous detachments the condition had grown worse.

After four months, three patients, including the one with the large bilateral detachments, returned and the retina had reattached completely in all.

As may be noted from table 5, the blood pressures in these cases were high and the toxemia severe. Strangely enough, the general edema was not pronounced.

Thirty-five of the forty-seven patients returned for observation after four months. Fifteen had normal fundi, fifteen showed angiosclerotic changes in the retinal vessels and five had retinitis. Of the fifteen cases with normal fundi, nine had either been normal or had shown only angiospastic changes on admission; of those showing angiosclerosis, one had been angiospastic, three had shown retinitis and eleven had had angiosclerosis on admission; of those with retinitis, all had shown similar findings on admission. The more severe fundus changes were encountered, as a rule, in those with higher blood pressures.

In 28 patients the blood pressure was lower than it had been on the ninth day post-partum examination, but in seven the blood pressure had increased. Three of those in the latter group had had retinitis on admission, two had shown retinal angiosclerosis, but in the remaining two there had never been any fundus pathology.

CONCLUSIONS

From a survey of 47 cases of hypertensive toxemia of pregnancy which occurred in 2,365 pregnant women, the following conclusions were drawn:

Ophthalmoscopic examinations of the fundi were of value in the diagnosis, prognosis, and management. Retinal changes should be added to the accepted diagnostic triad; that is, hypertension, albuminuria, and edema.

TABLE 6

FOUR MONTHS AFTER DELIVERY

Fundi	B.P.* under 140	B.P. 140–180	B.P. over 180	Total
Normal	13	2	0	15
Angiospasm	0	0	0	0
Angiosclerosis	3	11	1	15
Retinitis	1	1	3	5
Total	17	14	4	

* Blood pressure.

Approximately only one third of the patients with toxemia complained of visual disturbances.

Retinal changes appeared more or less to parallel the severity of hypertension and thus of the toxemia: in those with normal fundi the average blood pressure was 165/109; those with spasm of the retinal arterioles showed an average blood pressure of 170/108; in the group with angiosclerosis the average blood pressure was 181/118; and those with retinitis had an average pressure of 199/137.

Patients with normal fundi or angiospasm rarely showed permanent damage to the vascular system or kidneys at the examination four months after delivery. Those with angiosclerosis or retinitis frequently showed signs of permanent damage at that time. Hence the prognosis is not good, as a rule, for those with organic changes in the retinal vessels or retinitis.

The retinal changes did not parallel either the albuminuria or edema.

Patients with retinitis almost invariably showed an increase in the number and extent of the retinal lesions for a few days following delivery.

Patients with normal fundi or angiospasm may be treated conservatively. The fundi should be studied frequently and, if indications of organic change in the vessels or retina appear, the uterus should be emptied. In cases of angiosclerosis of the retinal vessels or retinitis, it is safer to empty the uterus at once.

REFERENCES

[1] Wagener, H. P. Arterioles of retina in toxemia. Trans. Sect. Ophth., Amer. Med. Assoc., 1933, p. 88.

[2] Masters, R. J. Routine ophthalmoscopic examination as aid in management of maternity cases. Trans. Amer. Ophth. Soc., 1933, v. 31, p. 416.

[3] Hallum, A. V. Eye changes in hypertensive toxemia: 300 cases. Jour. Amer. Med. Assoc., 1936, v. 106, p. 1649.

CONTACT LENSES WITH SPHERIC OPTIC AND ASPHERIC HAPTIC PART*

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In his paper "Fitting of contact lenses for persons with ametropia" T. E. Obrig[1] has given a thorough outline concerning the history of the development of these important devices as well as the different purposes for which contact lenses can be used successfully. He also mentions the different types and makes of contact lenses, referring to the ground Zeiss lenses and the blown Müller (Wiesbaden) lenses. Furthermore he gives a description of the Dallos[2] proceeding in molding lenses individually from casts taken from the patient's eyes.

In his conclusions Obrig points out that "patients with irregular scleras cannot wear spherical lenses comfortably" and, that "blown contact lenses with ground corneal portion, entirely different from the Müller type of lens, can be made from casts after they have been modified in form. These lenses are reported as being comfortable to wear during the entire day.... Continued use and research with this type of lens may possibly result in the eventual use of this method to fit all contact lenses."

The bibliography of Obrig's paper enumerates a rather large number of publications on the subject under consideration. I find mentioned in it a paper by Müller-Welt[3] "Ueber Haftgläser." But Obrig does not refer to the new type of contact lenses described in the Müller-Welt paper, which was read at the thirtieth meeting of the "Württembergische Augenärztliche Vereinigung" (October, 1934). In my opinion this type of contact lenses, or, as they are called by the firm Gebr. Müller-Welt, "Corneo-Scleral-Schalen" represents a revolutionary change in the development of contact lenses.

Since I have been able to watch the development of these most valuable substitutes for spectacles very closely for a long period and have had the opportunity to furnish them for a great number of patients during the last decade, I should like to direct the attention of ophthalmologists to this new type of contact lenses.

As a matter of fact, there is no patient who has perfectly regular scleras. The surface of the sclera is always more or less aspheric. Therefore, as pointed out by Obrig, the scleral or haptic portion of the contact lenses also needs to be aspheric, whereas the corneal or optic part must be perfectly spheric.

The question arises whether it is possible to create standard types of contact lenses combining both factors, in order to fit the average patient's eye without the use of individual casts for every case. The answer is in the affirmative.

Formerly Gebr. Müller-Welt manufactured blown lenses which more or less resembled the ground Zeiss lenses in size and shape. The optic part of these lenses had no refractive power of its own, the additional refraction being produced by the "fluid lens" formed between the anterior surface of the patient's cornea and the posterior surface of the glass cornea. The scleral parts were also spheric and were manufactured in three different curves of 11-, 12-, and 13-mm. radius. Those blown lenses gave a fairly good result in most of the cases, and I used them for different types of cases, especially refractive errors, for a number of

* The clinging, scleral part, from the Greek: ἅπτειν.

years. However, the Müller-Welt lenses had the same disadvantages as have the Zeiss lenses, so well known to every oculist who has to supply patients with them. Patients, particularly those with less experience and skill, had difficulty in excluding air bubbles in the pupillary region, since the lenses, filled with normal salt solution or Ringer solution, had to be applied in a nearly horizontal position, with the head bent forward. The edge of the spheric scleral part of the lens, resting upon the anterior section of the usually aspheric sclera, exerted an uncomfortable local pressure on these areas where the scleral radius was smaller than in adjacent areas, causing local pinching of conjunctival and episcleral blood vessels, and probably nutritional disturbances of the corneal tissue.

In 1933 Dallos[2] first published his method for molding casts, and furnished contact lenses with aspheric haptic parts to fit individually the scleras of the individual patient. The Dallos procedure is described by Obrig. Five different casts have to be taken from every eye, when looking in five directions of gaze: to right, to left, up, down, and straight ahead (primary position). These different casts have to be combined to form the positive mold, from the basis of which the negative, that is, the individual contact lens, is blown. Dallos says that 30 to 40 minutes is the time required for taking the casts from one eye. But it is probable that only very experienced and exceptionally skillful ophthalmologist will be able to take five casts in such a short time. The proceeding seems to be rather complicated, to say nothing of the inevitable discomfort caused to the patient. Dallos himself expresses the hope that it may be possible in the future to manufacture standard models of aspheric contact lenses which will be satisfactory for the average patient; as follows:

> I am convinced that the meticulous and unwieldy technique of molding will be simplified according to practical necessity. I even hope that in the great majority of the cases it will later become entirely unnecessary when, with its avoidance, such data will be available, that from an adequate set of lenses, it will be possible to select one which can be tolerated by the patients. I think that as, in shoes, some forms in different sizes will satisfy nearly everybody, though there are no two individuals with like feet, certain types of contact lenses will be developed, with certain concavities and marginal forms and with adequate gradation in size to fit most cases. However, just as there is a certain percentage of feet which can tolerate only individually made shoes, the same will be the case with contact lenses, and the molding will never be, therefore, entirely unnecessary.
>
> But all this is still a dream of the future. For the present the problem of the haptic portion still demands final appropriate series of experiments with due regard to modern technical possibilities. . . .

In the meantime, in the opinion of the present writer, that dream has become a reality. As mentioned above, the new Müller-Welt model was developed to overcome previous disadvantages. The task was to create a combination of a perfectly spheric ground optic part with a blown aspheric scleral part. The new lenses are primarily blown lenses manufactured by means of carefully graded matrices. The optic division is ground secondarily.

The new lenses are much larger than the Zeiss lenses. This has some important advantages. The posterior surface of the lens covers a larger part of the globe, distributing the pressure over a larger area. The edge of the lens rests rather far back toward the transition fold, where the conjunctival and episcleral tissue is thicker and softer. The danger of compression of pericorneal blood vessels, so important for nutrition of the corneal tissue, is nearly eliminated. Last, but not least, most patients can handle a large contact lens much more easily than a small one. The periphery of the lens has a slightly asymmetric shape flattened on

three sides, and broadly resembling a three-sided domelike pyramid with smoothly rounded edges. Put in place between the lids and the globe, the lens is allowed to find its own position around the central axis, following the direction of least resistance. The circumference of the lens is large enough to disappear completely even at the nasal and temporal sides, thus becoming perfectly invisible, whereas the smaller lenses often produce a visible mark when the eyes are moved laterally. The lenses are now made in nine different graded haptic curves.

The ground optic part is no longer an afocal lens with concentric anterior and posterior surfaces, but is now provided with negative or positive refractive power in proportion as it is needed in each individual case of refractive error (myopia, hyperopia, aphakia, astigmatism, and so on). The change in refraction is produced mostly by the essential refractive power of the lens itself, only to a very small degree by a capillary layer of fluid interposed between the posterior surface of the glass cornea and the anterior surface of the human cornea, in as much as the inner radius of the former nearly conforms to the radius of the anterior surface of the latter, and therefore only a very small amount of fluid is needed. It is only necessary to moisten the cavity of the lens with a few drops of normal salt solution before putting it in place. The question of the choice of a definitely appropriate fluid adjusted to a certain individual pH has become practically insignificant, for the small amount of fluid needed to form the capillary layer is rapidly replaced by tear fluid. Only a few cases of keratoconus and of high irregular astigmatism need a somewhat larger amount of fluid to eliminate the dead space between the spheric glass surface and the aspheric corneal surface.

The new contact lenses are manufactured according to a special patented cooling process by which the internal tension of the glass is eliminated. They will not break even when transferred from ice to boiling water. In fact, they are entirely safe, and the danger of spontaneous breakage is practically nonexistent. It is believed by the most eminent authorities, Heine[4,5] and others, that contact lenses are less dangerous to the wearer's eyes than ordinary spectacle glasses. In the great number of cases I have had to fit with contact lenses during the last eight or nine years I have never seen any damage to a patient's eye by the use of contact lenses of different types.

According to my own experience, the new Müller-Welt contact lenses give the most satisfactory results, because it has been possible to combine a blown aspheric haptic part with a ground focal optic part which furnishes the needed refractive power. Generally, patients become used to this type much more easily than to the old forms. I have had occasion to see patients who had not been able to wear spherically ground lenses longer than three quarters of an hour, but could immediately wear the new Müller-Welt lenses six or seven hours without irritation or inconvenience.

Although I do not expect that ordinary spectacle glasses will be replaced entirely by contact lenses or that the optical industry has any reason to be afraid that spectacles will ever become unnecessary, on the other hand I am quite sure that the improvement in the optic and especially in the haptic properties of contact lenses will enable oculists to supply more and more patients, whatever the type of ametropia, with this priceless help for temporary or continuous use when wearing of spectacles is either impossible or objectionable.

The indications, occupational as well as

social, for recommendation of contact lenses in cases of refractive error, keratoconus, and so on, have been enumerated so frequently (Heine, Obrig, and others) and the advantages are so clear and so well known, that I may content myself with references to the literature of the last ten years in this regard. I wish, however, to call special attention to one additional opportunity for further development in technique.

With the further improvement of manufacturing technique, particularly regarding haptic properties, I hope confidently that it will be possible to help a special group of patients who could not formerly be relieved; namely, the group of aniseikonias, the cases of anisometropia or unilateral aphakia.[5] As the reduction in size of retinal images in myopia, as well as the enlargement in hyperopia, is less pronounced with the use of contact lenses than with spectacle glasses, it seems not impossible that even cases of a high degree of anisometropia may be corrected successfully by a combination of contact lenses with aniseikonic lenses. This would be exceptionally important in cases of unilateral aphakia, particularly in young and middle-aged patients (traumatic cataract). For example, until now it has been customary to consider as practically blind an eye that has been rendered aphakic as a result of injury, even though the aphakic eye had good visual acuity with a cataract glass; for the reason merely that the aniseikonia resulting from the absence of the crystalline lens was usually too great to permit binocular vision. By putting a negative (reducing) aniseikonic spectacle lens without refractive power in front of the aphakic eye that has been supplied with its proper contact lens, or a positive (enlarging) aniseikonic spectacle lens in front of the nonaphakic eye, the difference between the two images could be further reduced practically to zero. A slight residual difference would probably not prevent good binocular vision. Both eyes could work together again, and the handicap experienced by persons with unilateral aphakia in the presence of good visual acuity could be abolished almost completely. I understand that experiments in this direction are already under way in this country and I strongly hope that the problem may be solved in the near future.

I have frequently been asked about the technical procedure for supplying patients with the new contact lenses without resorting to the complicated molding and casting process. It is, of course, possible to fit patients satisfactorily by means of a set of at least 20 trial contact lenses, with the further help of the ordinary trial lenses placed in front of the eye, so that the necessary refractive power in the contact lenses may be ordered. The latter have to be ordered individually from Germany. The following data are required: (1) the corneal refraction, measured with the ophthalmometer; (2) the total refraction, obtained by retinoscopy and subjective examination; (3) the diameter of the contact lens, which depends chiefly upon the size of the palpebral fissure and the shape of the conjunctival sac; (4) the scleral curve, found by use of trial contact lenses as critically studied with the corneal microscope and slitlamp.

It is always advisable to let the patient wear the best-fitting trial contact lenses for several hours on different days in order to learn his tolerance of the lens which is to be ordered, adding spectacle lenses, if necessary, to the amount of the negative or positive difference of total refraction. Fitting of contact lenses can be carried out only by a well-trained and -equipped ophthalmologist, for he has to control the fitting with corneal mi-

croscope and slitlamp. It is furthermore necessary that the ophthalmologist who wishes to undertake the fitting of contact lenses shall have at his disposal a sufficiently large trial set. As most patients are not familiar with these comparatively new devices they usually wish to know by experience how they work. If they have sufficient intelligence and confidence they will be satisfied if the ophthalmologist tells them that it is most important to know whether they will be able to wear the contact lenses for a considerable time without inconvenience and that immediate perfection of the optical correction is of secondary importance. Generally patients like to see the immediate effect as to visual acuity, and are not so much interested in the technical details of haptic adjustment. It seems, therefore, desirable that the ophthalmologist who undertakes the fitting of contact lenses shall have at his disposal a set sufficiently large both haptically and optically. A set of about 120 different lenses will probably be sufficient for that purpose, except in extraordinarily complicated cases. It cannot be required of every ophthalmologist that he possess so expensive a set, especially if he needs to supply patients with contact lenses only occasionally. Two possible ways of dealing with the situation are therefore suggested: Either one ophthalmologist who is particularly experienced and interested in this subject may take the risk of holding such a set in stock in order to supply a certain region; or the local (state or city) ophthalmological society may assume the financial burden collectively and place the set at the disposal of every member who undertakes this work. The set has to be replenished from time to time.

Conclusions

Since the human sclera is aspheric in shape the haptic part of the contact lens must also be aspheric.

Müller-Welt contact lenses of the new type are composed of an aspheric haptic part and a spheric optic part. The lenses are primarily blown; the optic part is ground secondarily.

The refractive power must be supplied by the refractive effect of the contact lens itself, and only in slight degree by a thin fluid layer between the glass cornea and the human cornea. Thus only a small amount of fluid is needed. This is important, as it makes it much easier for the patient to put the contact lens in place without air bubbles.

Large contact lenses are better tolerated than small ones, as the pressure is distributed over a large area of the eyeball.

Every kind of refractive error can be corrected by contact lenses. It is anticipated that refractive aniseikonia, as well as anisometropia and unilateral aphakia, will in time be corrected effectively by unilateral use of contact lenses, possibly with the further aid of supplementary aniseikonic lenses.

References

[1] Obrig, T. E. Fitting of contact lenses for persons with ametropia. Arch. of Ophth., 1937, v. 17, June, pp. 1089-1120.
[2] Dallos, J. Ueber Haftgläser und Kontaktschalen. Klin. M. f. Augenh., 1933, v. 91, p. 640.
[3] Müller-Welt. Ueber Haftgläser. Klin. M. f. Augenh., 1935, v. 94, p. 108.
[4] Heine, L. Ueber den Ausgleich sämtlicher Brechungsfehler des Auges durch geschliffene Haftgläser, Münchener Med. Woch., 1930, v. 7, p. 271.
[5] ———. Ueber Haftgläser. Klin. M. f. Augenh., 1933, v. 1, Beilageheft.
[6] Hessberg, R. Ueber den Ausgleich einseitiger Linsenlosigkeit durch Haftgläser. Zeit. f. Bahnärzte, 1932, v. 27, p. 338.

NOTES, CASES, INSTRUMENTS

REMOVAL OF LARGE FOREIGN BODY FROM VITREOUS

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On September 2, 1930, a 21-year-old man sustained an injury to his left eye. He was hammering on a steel rail. When seen, a few hours after the accident, the eye seemed to be destroyed. There was no light perception. The bulb was collapsed; the anterior chamber filled with blood; the pupil pear-shaped. There was blood beneath the conjunctiva everywhere. A linear wound in the outer lower quadrant, 1.5 cm. long, paralleled the limbus, running 5 or 6 mm. from it. The X-ray picture showed a large intraocular foreign body.

After inducing topical anesthesia with cocaine solution, the writer easily removed the foreign body with a hand magnet. Some bleeding followed. The conjunctiva was sutured over the wound. In size the steel splinter measured 1 cm. by 8 mm. by 4 mm. The postoperative care included rest in bed, atropine, and milk injections.

Recovery was uneventful and vision in the left eye slowly returned. On the second day light perception was present in the temporal field, and on the following day the patient could distinguish fingers at two feet. By the fifth day vision in the left eye was 20/200. Three days later the bandages were taken off because of a newly developed conjunctivitis. On the fourteenth day the presence of a peripheral radial tear in the iris at the five-o'clock position and large vitreous floaters were noticed. Vision in the left eye with correction was 20/50 on the eighteenth day. In the lower outer quadrant in the vitreous chamber was a dark tonguelike mass, freely movable, over whose surface blood vessels coursed. The mass was probably composed of retina and choroid and, it was thought, constituted an anterior disinsertion with a floating flap. The original wound of entry seemed not to have involved the ciliary body, but to be adjacent to it.

At the end of the second month the vision with a high mixed-astigmatic correction was 20/33. A small area of retinal detachment was seen peripherally in the lower outer quadrant. At five months the patient complained of photopsia, especially at night. The tension had slowly risen to 13 mm. Hg. The retina had completely reattached itself at the site of the wound, and the vision was 20/25 with correction. There was notching of the visual field in the nasal quadrant.

A year and a half later there were present a pear-shaped pupil, a peripheral hole in the iris at the five-o'clock position, a crescentic whitish pigmented scar in the lower outer quadrant of the retina and choroid, a high mixed-astigmatic error, and a difference of accommodation of five diopters, as compared to the accommodation of the right eye.

The condition remained unchanged for four years. When seen seven years after the injury, after an absence of three years, the patient had vision of 20/25 plus 3 or 4 letters; the tension was normal to fingers; the pear-shaped pupil dilated evenly; and under homatropine the hole in the iris could be seen. There were some vitreous floaters and some minor lens changes in the posterior cortex of the lens. The large, whitish, crescentic pigmented patch of choroidal change was present as before, and there was a narrow zone of flat retinal detachment transversely in the upper inner and outer

quadrants, from the eleven to the four-o'clock position, especially along the superior temporal branch of the retinal artery. The detachment began quite far peripherally and extended forward as far as could be seen toward the ora serrata. The visual-field studies disclosed some concentric contraction of the lower quadrants. The notching of the upper nasal quadrant remained as before. An examination made by means of the Koeppe contact glass was undecisive for retinal tears.

8 South Michigan Avenue.

CYANOSIS RETINAE*

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Cyanosis retinae is characterized by a marked visible widening and tortuosity of the arteries and veins and by a very dark, purplish-blue color of the blood within the retinal vessels. The same characteristics may also be visible in the bulbar and palpebral conjunctivae. This condition is found usually associated with a congenital heart lesion, and usually where there is an embarrassment of the pulmonary circulation. According to Adam[1] it may be present also in pneumonia, emphysema, and idiopathic polycythemia. Ernst Fuchs[2] states that cyanosis retinae may occur also from the actions of certain poisons (dinitrobenzol).

We are told that cyanosis retinae is not uncommon. In the literature on the subject there are available only five anatomical studies, and in the last seven and a half years I have encountered the condition only once, notwithstanding the availability of an enormous clinical material. In the diagnosis index of Dr. Harry S. Gradle's private practice, no provision is made for the inclusion of cyanosis retinae. As further proof that cyanosis retinae is not at all common, Dr. Martin Cohen, in his report of seven cases of polycythemia, says "Since few cases of polycythemia have been observed at the medical clinic and service of the New York Post-Graduate Medical School and Hospital, my associates and I were obliged to obtain additional patients for presentation." I am taking the liberty, therefore, of presenting a case occurring in a young boy.

J. C., 8½ years old, was admitted to Michael Reese Hospital for the first time in 1932. He was readmitted in November, 1933, and again in January, 1935, at which time he was first seen at the eye clinic. According to the father, the boy was delivered by means of forceps after 12 hours of difficult labor. At the age of three years, it was noticed for the first time that he had a bluish appearace, and at that time he began to have fainting spells, at least once weekly. Difficulty in breathing was apparent, and as the child became older he could forestall an attack by resting. As far as the father knew, the boy had never complained of visual difficulties.

In January, 1935, the patient was admitted to the hospital for examination prior to the extraction of a tooth. At this time his temperature was 100°F., the pulse 100, respirations 28. He appeared under-developed, and the skin of his back and shoulders was peeling from sunburn. There was a generalized cyanosis of the skin and mucous membranes. Lungs were normal on physical examination. Cardiac examination revealed a systolic thrill over the apex, diffuse, extending to the second rib on the left. The apex beat was diffuse but forceful. The right heart border was not displaced outward. There was a loud systolic blow over the apex, heard all over the precordium, and very loud over

* Read before the Chicago Ophthalmological Society, Nov. 15, 1937.

the pulmonic area also. This covered over the first heart sound, but ended with a fairly clear second sound. A2>P2. There was no aortic murmur.

An X-ray study of the chest showed the transverse heart diameter as 8.5 cm. and the transverse chest diameter as 17.2 cm. The heart was somewhat slipper shaped.

Electrocardiogram studies showed a sinus arrhythmia, a right ventricular preponderance; indicating myocardial involvement.

Blood findings:	1932	1933	1935
Erythrocytes	4,330,000	4,400,000	7,500,000
Leucocytes	9,900	6,050	11,350
Hemoglobin	90%	75%	100%

Blood gas analyses were made by the chemistry department of the Michael Reese Hospital under the direction of Dr. David Cohn.

Blood Gas Analysis	Normal	Author's case
Blood pressure, systolic	120	105
Leucocytes	6,000	11,350
Erythrocytes	4,000,000	7,500,000
Total Hemoglobin % Sahli	90	100
in c.c. of .02 per 100 c.c. of blood	18	21.04
Oxygen content in c.c. per 100 c.c. of blood	12	6.93
Carbon dioxide in c.c. per 100 c.c. of blood	50	56.7
Oxyhemoglobin in percentage of total hemoglobin	65	60
Reduced hemoglobin in percentage of total hemoglobin	35	32

The above calculations were made on venous blood; they were to be carried out on arterial blood also, but due to the extreme difficulty in obtaining arterial blood in this patient, the latter was abandoned.

The skin of the lids was markedly cyanotic and the bulbar and palpebral conjunctival vessels were wider and darker than normal. The irides were dark brown; the media clear; the fundi identical. Retinal veins were quite dark and tortuous and were in the ratio of about 3 to 1 as compared to the arteries. The optic discs were also dark and hyperemic, the borders being sharply defined. Maculae and peripheries were normal. The entire background was of a dark-bluish tint. The vessels were accompanied by wide reflex stripes; their caliber was regular throughout. No lesions were apparent.

Vision was 1.0 in each eye and J1 was read at the normal distance. The extraocular muscles were normal, the central and peripheral fields within normal limits. Accommodation was normal, as was the intraocular tension.

That a combination of changes takes place secondarily in the production of this condition is held by Kronfeld,[3] who lists them as (a) an increased number of red blood cells, (b) an increased amount of hemoglobin, and (c) a more or less markedly increased blood volume.

Leber[4] states that a polycythemia must be present before the fundus takes on a cyanotic appearance. The existence of a definite relationship between the polycythemic condition of the blood and the amount of retinal cyanosis was determined by Woods and de Schweintz.[5] They showed that in order to produce a definite cyanosis of the retina, an average of 7,836,000 red blood cells and 115 percent of hemoglobin were necessary.

On the basis of the anatomical findings in his case, which was presented in Vienna in 1925, and with the findings of other workers whose data substantiated his, Kronfeld groups cases of congenital heart disease under two categories; those with normal ocular function, which usually show a low blood pressure, and those with disturbed ocular function, which may show a hypertension. He reports a case of an 18-year-old male with congenital heart disease who came to autopsy. Clinical and anatomical findings were very excellently correlated in this paper and need no repetition here.

In this case, which he followed for

two years, there was a swelling of the nerve head all the time and the anatomical sections showed that at no time was there an optic atrophy. Vision was 6/6 in the right eye and 6/18 in the left eye, corrected. Kronfeld adds this case to the first group. Knapp[6] in 1861, and Brailovskij and Glekler[7] in 1927, reported cases which also belong to the first group.

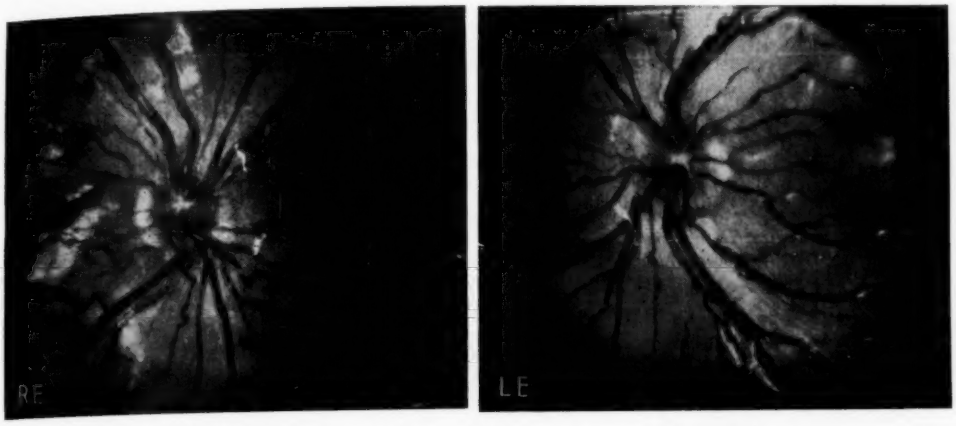

Fig. 1 (Shapira). Fundus of right and left eyes in a case of cyanosis retinae.

To those in the second group, which ultimately come to a glaucomatous condition, may be added the cases of Baquis[8] in 1908, Goldzieher[9] in 1904, and Ginsburg[10] in 1928.

According to Cohen,[11] an additional factor to be considered in the production of the engorgement of the retinal veins, which has not hitherto been suggested by other workers, is a change in the structure of the veins, a thinning of the venous wall. Cohen also states that the purplish color is due to excessive replacement of oxygen by carbon monoxide.

Conclusions

1. A case of cyanosis retinae in an 8½-year-old boy is reported.

2. From a review of the literature it is obvious that the condition is not commonly seen.

3. Conditions necessary for the production of cyanosis retinae are a red-blood volume of between seven and ten million cells and a hemoglobin content of between 100 and 115 percent.

8 South Michigan Avenue.

Bibliography

[1] Adam, C. Ophthalmologische Diagnostik. Wien, Urban u. Schwarzenberg, 1912, p. 102.
[2] Fuchs, E. Textbook of opthalmology. Lippincott & Co., 1929, p. 731.
[3] Kronfeld, P. Amer. Jour. Ophth., 1931, v. 14, Oct., no. 10, p. 1108.
[4] Leber, Th. Graefe-Saemisch Handbuch. Ed. 2, 1915, v. 1, p. 8.
[5] Woods, A. C., and de Schweinitz, G. E. Trans. Amer. Ophth. Soc., 1925, v. 23, p. 90.
[6] Knapp, H. Quoted by Kronfeld.[3]
[7] Brailovskij S., and Glekler, F. Zent. f. d. ges. Ophth., 1927, v. 18.
[8] Baquis, E. Graefe's Arch. f. Ophth., 1908, v. 68, pp. 2, 177.
[9] Goldzieher, W. Zeit. f. prakt. Augenh., 1904, v. 28, p. 257.
[10] Ginzburg, J. Klin. M. f. Augenh., 1938, v. 81, p. 591.
[11] Cohen, M. Arch. of Ophth., 1937, v. 17, p. 811.

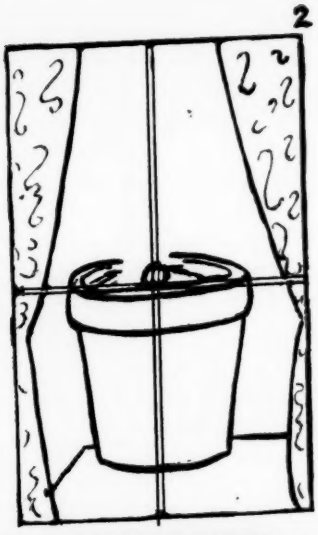

Fig. 1 (Berens). Cards 2 and 2A depict a flower and a flower pot. In order to place the flower in the pot, the patient must have first-grade binocular vision.

FIG. 1

Fig. 2 (Berens). In order to fuse cards 23 and 23A, "Popeye and Olive Oil," second-grade binocular vision must be present. Special controls to check the patient's ability to fuse have been placed on the cards.

FIG. 2

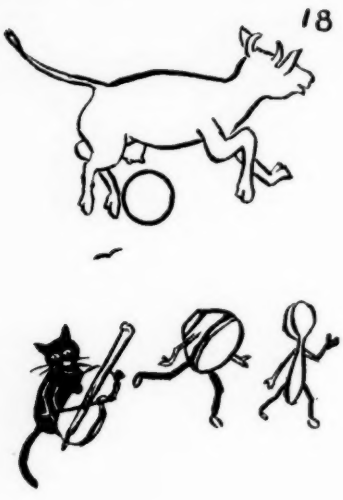

Fig. 3 (Berens). Cards 18 and 18A, "The cow jumping over the moon," are useful in testing and developing third-grade binocular vision. To check the patient's answers, the cards may be reversed.

FIG. 3

STEREOSCOPIC CARDS IN COLOR FOR CHILDREN*†‡

SERIES A

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The endeavor to obtain more than a mere cosmetic result in the treatment of strabismus has been greatly stimulated by the development of the major amblyoscopes, which have contributed both to diagnosis and treatment. Provided amblyopia is not too marked, a cosmetic result in operations for strabismus is no longer considered sufficient by the majority of ophthalmic surgeons. Opinion is changing even in regard to the possibility of developing useful second-grade binocular vision in alternating strabismus.[1, 2, 3, 4]

The restoration of normal binocular vision and the development of stereopsis, especially in children, may be aided by the use of interesting cards.

Cards in color, a few of which are herewith illustrated, apparently have stimulated interest and fusion better than black-and-white cards and may be used in hand or other stereoscopes, especially in the correcteyescope (junior and senior models) and the rotoscope.

The cards may be used rapidly for obtaining an impression of the degree of vertical and lateral heterophoria, the presence of high degrees of aniseikonia, and for the determination of the presence or absence of first, second, and third-grade binocular vision. The cards are also of value in developing first, second, and third-grade binocular vision and lateral and vertical amplitude of fusion in patients with heterophoria and heterotropia (figs. 1, 2 and 3).

Although many excellent sets of cards are available, children always want new cards. Series A is suited to the interests of children five years of age and older. Another series, B, is adapted to children under five years of age. Especial effort has been made to depict objects, animals, and characters known by, and of interest to, children between the ages of three-and-a-half and five years.

Most of these cards stimulate stereopsis. In their normal position, the card with a number and a letter is on the right and the card with a number only is on the left. If a certain depth relationship exists in this position, the cards should be reversed; that is, the card with the number and letter should be placed on the left and the numbered card on the right. When the cards are reversed the observer should be able to note a reversal in the depth relationship of the figures.

In order to increase the value of these cards, a number of them have been drawn so that they are extremely difficult to fuse.

Summary. Stereoscopic cards are described which are designed for children five years of age and older. The cards depict objects, animals, and characters known to the age group and are colored for added interest.

The courtesy of the Walt Disney Company for permission to use several of their popular characters is gratefully acknowledged.

35 East Seventieth Street.

* Presented before the American Ophthalmological Society, June 3, 4, 5, 1937, Hot Springs, Virginia.

† Drawings by Miss Patricia Rainier.

‡ Aided by a grant from the Ophthalmological Foundation, Inc. and Distributed by A. Haustetter, Inc., New York, N.Y.

REFERENCES

[1] Pugh, M. A. Personal communication, June 19, 1934.
[2] Mayou, S. Personal communication, October 13, 1936.
[3] Jackson, A. Personal communication, October 6, 1936.
[4] Berens, C. Surgical results in 223 cases of heterotropia. Especial reference to orthoptic training. Amer. Jour. Ophth., 1937, v. 20, p. 266.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

September 14, 1937

Dr. C. D. Blassingame, *presiding*

Glaucoma

Dr. E. C. Ellett presented the following cases as a contribution to the prognosis of glaucoma. In two of them integrity of the eye had been maintained for 11 years as the result of the operation—a trephining in each instance. The third patient retained vision in spite of a continued hypertension, which suggests that ocular hypertension, like high blood pressure, may be present for a long time without bad effects.

Mrs. C. was seen in 1919, then aged 39 years. Her right eye was normal, the left blind from chronic glaucoma; intraocular tension 120 mm. Hg (McLean). Miotics were used, except for a time in 1922 when she was not treated and went without her glasses (+2.00 D. sph.). The tension, visual field, and vision remained about the same, but the nerve showed slight cupping, and a trephining with peripheral iridectomy was performed in January, 1924. Exactly 10 years from that day the eye was found to have tension 16 mm. Hg; vision 6/6 and J 1 with glasses, and the visual fields were unchanged. In July, 1935, the condition was the same.

Mrs. F., aged 68 years, was seen in November, 1926, with all the signs of chronic glaucoma and intraocular tension of 47 mm. Hg; vision was R. E. 20/40 and L. E. 20/30 with glasses. Both eyes were trephined with peripheral iridectomy. The left eye had a choroidal detachment which subsided. In April, 1937, the vision was 6/15 in each eye with glasses, tension 10 and 8 mm. Hg, visual fields unchanged. In 1926 there was incipient cataract in the left eye and the patient now has incipient cataract in both eyes.

Mrs. J. has been under observation since she was nine years old, in 1908. She wore glasses (O.D. +5.50 D. sph., and O.S. +4.00 D. sph.) for a convergent squint, and was cured. Vision in the right eye was 20/30 and in the left eye 20/20 with glasses. In 1921, she had an acute choroiditis in the right eye, the lesion being just above the macula. She was not seen again for 14 years, when she came with acute glaucoma in the right eye. There was a pigmented scar above and very close to the macula. Tension varied from 34 to 45 mm. Hg, not materially affected by miotics. A trephining with complete iridectomy was performed on March 10, 1935. On April 7, 1937, vision was 6/6 with glasses. The pupil was 8 mm. in diameter and had never been down under eserine; the tension was 35 mm. Hg. A month after the operation the tension was 55 mm. Hg and did not go below 40 mm. for a year. The left eye was normal.

Mrs. M. J. was seen in 1907, and was at that time 62 years of age. She had chronic simple glaucoma of about two years' duration. No previous examination or treatment had been given; her vision 20/40 with glasses in each eye. The optic nerves were cupped, the visual fields contracted, on the right nasally, on the left concentrically. After consultation with Dr. J. L. Minor an operation was advised. This was before the days of the tonometer or of sclerotomes. Tension was recorded as plus one. An iridectomy was

made on the right eye in November, 1907, and on the left eye in January, 1908. A marked filtering scar resulted, accidentally, of course, in the right eye, with less filtration in the left eye. In 1922 vision was 15/70 in the right eye, and in the left eye the ability to see moving objects. Tension was 18 mm. Hg in the right eye and 22 mm. Hg in the left. She died in 1927. Vision was retained in the right eye for 20 years.

Retrobulbar neuritis

Dr. E. C. Ellett presented Mr. H., seen in 1929 for headache. Vision was normal. The headache was probably relieved by an appendectomy in 1935. A general physical examination of the patient including nose, throat, sinuses, and teeth was normal. In July, 1936, his vision was normal, but there was a return of the headache. In March, 1937, he noticed poor vision in the left eye. Though normal on March 9th, on March 17th it was reduced to 5/60 and J 14. The eyeground and everything about the eye was normal. The visual field showed a central scotoma. No cause was found. The treatment by intravenous injection of sodium nitrite was tried, the patient receiving daily injections for six days. Dr. McKinney reported one of his cases to this society this winter in which this treatment gave prompt but temporary relief to an elderly man with arteriosclerosis. No improvement followed in this patient, vision being 3/60. On March 23d he was put on mixed treatment by mouth, 1/48 of bichloride and 5 grains of KI after meals. On the 25th vision was 6/24. Improvement continued and on April 3d, vision was 6/6 and J 1 with a very small central scotoma.

Progressive exophthalmos

Dr. R. O. Rychener presented Mr. B. L., aged 58 years, whose condition had been followed during the past year with initial symptoms of vertical diplopia, apparently due to paresis of the right inferior rectus. Later, other muscles were involved so that total paralysis of the right superior rectus developed. Within the past few months exophthalmos developed, causing exposure keratitis and necessitating tarsorrhaphy on the right side. Repeated general examinations revealed nothing of consequence, until a late spinal-fluid examination showed the Kahn reaction to be 2 plus and the cell count 30. Treatment was instituted but has been of so short duration that no result can yet be expected. The basal metabolic rate of plus 41 was recorded on the day of presentation.

Pituitary tumor simulating retrobulbar neuritis

Dr. R. O. Rychener reported the case of Mrs. E. W. McC., aged 34 years, who two years previously had suddenly lost vision in her left eye, but it cleared spontaneously. In July, 1937, vision in the left eye suddenly failed again. Nothing, however, was done except to consult with an optometrist, who prescribed glasses, until August 20th, when she was first observed with a vision of 1/60 and a central scotoma in the left eye. Vision in the right eye was normal. Careful checking of the fields revealed bilateral involvement suggesting a lesion in the pituitary region.

An X-ray examination revealed almost total erosion of the sella and roof of the sphenoid, and a tentative diagnosis of adenocarcinoma was made. X-ray therapy was administered daily with marked improvement in the visual fields, which have more than tripled in size, as well as increase of visual acuity to 4/60 in the left eye. Inasmuch as the tumor seems radium sensitive, prognosis for vision is

good, while that for life is the reverse.

This case was presented mainly because it illustrates that pituitary tumor occasionally simulates retrobulbar neuritis in all of its characteristics.

Dinitrophenol cataract of late development

Dr. A. C. Lewis reported the following case: Mrs. S., aged 40 years, was refracted on June 12, 1934. Her vision was 20/15 O.U. without glasses and her eyes were apparently normal in all respects. A +1.00 D. sph. was prescribed for close work only. She then weighed 240 pounds and was taking thyroid tablets for obesity. She belonged to a family of hypothyroids and had taken from three to nine grains of thyroid extract daily since childhood.

On November 20, 1936, she consulted him because of impaired vision. The central parts of the crystalline lenses were then cloudy. Bifocal lenses were ordered, giving her vision of 20/40 with a +1.00 D. sph. and reading ability for J 4 and a +1.25 addition. She continued teaching school until March 22, 1937, when she returned for consultation after an absence of four months. She had been almost blind for eight days. Vision was reduced to moving objects. A complete physical examination including spinal-fluid and basal-metabolism tests was negative. Upon close questioning the fact was elicited that in 1933, more than three years before her eye trouble began, a friend in New York sent her a package of dinitrophenol with instructions to take it until it caused her temperature to rise. After taking it one week her temperature rose to 102.5 degrees. She immediately discontinued the drug and took no more after that time.

Her weight was reduced only 20 pounds by this drug and promptly returned to 240 pounds in a short time. Early in 1936 she had a light attack of what she thought was influenza. After that she lost 90 pounds during the next six months. Her present weight remains around 160 pounds.

The right lens was extracted by the intracapsular method. A small amount of vitreous was lost. The left lens was removed with capsulotomy, uneventfully. She is now wearing a +12 D. sph. for each eye with 20/50 vision, and promises to have normal vision in a few more weeks.

Leiomyoma of the orbit

Dr. Phil M. Lewis presented B. M., colored, aged 18 years, upon whom he had operated for an orbital tumor. The boy was admitted to the John Gaston Hospital on August 27, 1936, with estivo-autumnal malaria. When he was sufficiently recovered he was transferred to the ophthalmological service. The history except that pertaining to the eye was unimportant. Protrusion of the right eye had first been noticed seven years previously and had gradually increased. Vision had become quite poor recently.

Examination revealed a very marked proptosis of the right eye, with a complete ptosis of the upper lid. The eyeball was displaced downward and outward as well as forward. Motion of the eye was greatly limited in all directions except downward and in this position seemed only slightly reduced. A large firm tumor mass could be palpated in the superior-medial quadrant of the orbit. The eyeball was normal externally, the media were clear, and the fundus was normal. Vision, however, was reduced to the ability to count fingers at five feet. Roentgen-ray examination showed the nasal sinuses and bones of the entire skull to be normal. The tumor mass in the orbit could be easily

seen on a "soft" lateral X-ray plate.

Operation under ether anesthesia was performed on September 10, 1936. The tumor was removed through a large conjunctival incision, dissection and removal being quite difficult owing to its large size and to the fact that it was bound into both the internal and superior recti and into the optic nerve. The tumor was an irregular oval mass, 30 mm. long by 17 mm. transversely, the long axis lying anteroposteriorly. It was of quite firm consistence, but nevertheless very vascular. The pathological department made the following report: "This tumor consists of smooth muscle and fibrous-tissue elements arranged in interlacing bundles, whorls, and strands. The fibrous tissue is not proliferative nor invasive, nor does it show signs of regeneration. Diagnosis: leiomyoma."

Following the operation, the eye was totally blind and the vitreous filled with blood. When the patient left the hospital two weeks after operation, the fundus was still not visible. The wound had healed and there was no proptosis of the eyeball. The patient disappeared and was not seen again until December 8, 1936, three months after operation. Complete ptosis and divergent strabismus were present. He could not turn the eyeball nasally. Upward motion was also limited. The eye was totally blind. The vitreous had cleared so that a very interesting fundus could be seen. The disc appeared as a round red ball due to an overgrowth of new small blood vessels. The retinal arteries and veins had almost entirely disappeared, being replaced by stalks of fibrous tissue. Considerable white exudate appeared in the retina. The latter was of a pale, grayish color and in certain areas was quite atrophic, so that the choroidal vessels were exposed. Above the disc there was a meshwork of newly formed blood vessels, somewhat suggestive of retinitis proliferans. Surgical correction of the ptosis and exotropia will be attempted later.

Concretions in the lacrimal duct

Dr. Phil M. Lewis reported a case of unusually large lacrimal concretion. E. W. W., a white man, aged 24 years, was seen in April, 1937, complaining of watering of his right eye for the past month. No previous epiphora had ever been noticed and he had not had a recent attack of rhinitis. He had tried using boric acid and zinc sulphate drops several times daily since the symptom began.

Examination showed the conjunctiva injected around the inner canthus and a little mucus in this region. Epiphora was marked and there was slight distention over the lacrimal sac. Pressure over the sac with the finger caused the explusion of considerable thick mucus from both puncta. Except for compound myopic astigmatism both eyes were normal.

Irrigation with a lacrimal syringe was attempted, but the saline solution regurgitated through the upper punctum. A number-one Bowman's probe was then employed, and after encountering considerable difficulty in the lower portion of the duct, it was passed successfully into the nose. Irrigation was again attempted without success, due to regurgitation through the upper punctum, which could not be prevented by finger pressure over the canaliculus. A small lid clamp was then fastened over the lacrimal portion of the upper lid so as to compress the calaniculus completely, but not tight enough to damage the lid or cause severe pain. A blunt lacrimal needle was passed well into the sac, preventing the saline from regurgitating through the lower punctum. Strong pres-

sure was applied to the plunger of the syringe. Suddenly a large mass of concretions burst into the nose, the larger of which was expelled from the nostril and fell to the floor. Numerous smaller particles were blown from the nose by the patient. Irrigation into the nose immediately became perfectly free and easy. The sac was filled with metaphen 2500 solution.

The patient was instructed to continue with zinc sulphate drops and report his condition from time to time. As one would expect, complete cure was immediate and there has been no recurrence of trouble.

The large concretion was of irregular oval shape and of the consistence of rather hard cheese. It measured 5 mm. in length and 3 mm. in circumference. There were four much smaller masses and considerable shreds of thick flaky mucus. All of the masses were of a dirty white color and of identical consistence and microscopic appearance. No fungi were found, the material consisting only of degenerated cells and amorphous debris. Cultures were made, but were negative.

J. Wesley McKinney,
Secretary.

BROOKLYN OPHTHALMOLOGICAL SOCIETY

October 21, 1937

Dr. Walter V. Moore, *presiding*

Acute secondary glaucoma due to cataract and (unsuspected) melanosarcoma of the choroid

Dr. Bernard Shermer reported the case of Mr. G. M., aged 55 years, who was seen on June 24, 1937, complaining of headaches, loss of vision, and pain in the right eye of three days' duration. History of failing vision dated back three years, when he accidentally fell and struck the back of his head. Occasional attacks of pain subsided.

The cornea of the right eye was steamy; the anterior chamber shallow; the pupil fixed, wide, and somewhat irregular above. The iris showed evidence of early atrophy above, corresponding to the irregularity of the pupil. The lens was opaque and white in color, suggesting a traumatic cataract, and showed considerable swelling above, which exerted pressure on the portion of iris involved. The fundus could not be seen. The tension was 75 mm. Hg (Schiötz). There was no light perception. The left eye was normal.

No relief was obtained by the use of miotics or by basal iridectomy. Since the left eye showed early symptoms of sympathetic ophthalmia, the right eye was enucleated. The pathologist reported a malignant melanoma of the choroid, detachment of the retina, secondary glaucoma, and cortical cataract. Sections through the tumor showed a spindle-cell structure with melanotic pigmentation of the cells. Further studies revealed no apparent evidence of metastases elsewhere in the body.

A second patient, Mr. C. H., aged 55 years, was admitted to the Long Island College Hospital on August 5, 1937. He complained of pain in the right eye of five days' duration and failing vision following a severe blow to the eye sustained in a hold-up, about three months previous to admission. He presented a picture of an acute secondary glaucoma due to a swollen, cloudy lens. The fundus could not be seen. Transillumination showed a clear reflex around the examined field.

When a basal iridectomy gave no relief the eye was finally enucleated and revealed a melanosarcoma of the choroid of the spindle-celled type. The etiology of melanosarcoma is unknown.

Both cases present histories of trauma either to the head or to the eyeball. Dr. Shermer questioned whether trauma is just a coincident or is etiologically responsible for the development of the neoplasms.

Discussion. Dr. P. C. Jameson said he was much interested in this presentation for it brought up a number of problems of secondary glaucoma following cataract. He imagined that if this case were to come before the Compensation Bureau, it would be claimed that the growth had been occasioned by the injury, whether that injury were slight or not. The Bureau is generally on the side of the laboring man, and this man would be compensated on the theory that the cataract was caused by the injury. Such cases are a problem; false attribution is most important.

Dr. W. F. Steinbugler stated that about 10 years ago he had presented before this Society, two cases of acute glaucoma with cataract. The eyes finally came to enucleation, and both showed sarcoma. He was able to follow one case for some time, but did not diagnose the sarcoma. In his opinion such eyes should always be enucleated because sarcoma is found so frequently. As regards relationship between sarcoma and trauma, he believes it to be just incidental. If trauma could cause a sarcoma we should see it more frequently. There should be no question of compensation in the second case. Sarcomas do not grow very rapidly and in three months the eye would not have shown much change.

The technique of blood transfusions

Dr. John M. Scannell reviewed the best in technique and outlined all precautions necessary in order to insure successful results. Motion pictures were shown.

History of blood transfusions

Dr. Andrew A. Eggston traced transfusion of animal blood to humans and brought the story down to modern times in which only human blood, carefully matched and tested, is transferred from person to person by the citrate or the syringe method.

Discussion. Dr. John Bailey stated that he was very much interested in the use of blood transfusion in sympathetic ophthalmia, and that he had used this treatment in a few cases.

Dr. P. C. Jameson said that before enucleation he would resort to transfusion in order to see if the sympathizing eye would quiet down.

Mortimer A. Lasky,
Secretary.

NEW YORK EYE AND EAR INFIRMARY

Clinical and pathological conference

October 25, 1937
Dr. Isaac Hartshorne, *chairman*

Melanotic sarcoma of the choroid

Dr. Loren Guy reported the case of a man who had had disturbed vision in the right eye for six months and pain for one week. The tension was 90 mm. Hg (Schiötz), the cornea steamy; vision, no light perception. The eye failed to respond to treatment so enucleation was performed. Melanotic sarcoma of the choroid was found.

Two years later the patient died at Meadowbrook Hospital of metastatic melanoma, chronic lymphatic leukemia being a contributing cause of death.

Discussion. Dr. Clyde E. McDannald said that a blood count might have been of value at the original examination.

Sarcoma of the choroid

Dr. T. R. Paganelli presented the case of a man whose left eye was prop-

tosed. The tension was slightly elevated. The cornea stained in part, and the conjunctival vessels were injected. Transillumination was satisfactory in all meridians. There was a flat detachment of the retina. The eye was enucleated, and a choroidal sarcoma found. The man died two months later.

Intraocular tumor?

Dr. Donald Savage presented a case of questionable intraocular tumor with detachment of the retina. The patient was struck in the right eye one-and-one-half years ago. She had slight discomfort but good vision. Three months later, the same eye became painful. She saw an ophthalmologist, who gave her reading glasses. Slight discomfort continued, until she visited Dr. Samuels's clinic in September, 1937. The vision was hand-movement detection O.D.; tension O.D. 4 plus to fingers; O.S. normal. The right eye showed a steamy cornea, shallow anterior chamber, dilated pupil, many new-formed blood vessels, and ectropion of the margin of the pupil. The media were hazy, and the nerve head could not be seen; vision was light perception in the left eye; transillumination was negative. She was admitted to the hospital on October 1st and given typhoid intravenously; six days later a milk injection. Treatment with hot bathing, eserine 0.5 percent, pilocarpine 2 percent was started. No improvement in tension was noticeable with this treatment. No light perception was present two days after admission. On October 16th, Dr. Bernard Samuels performed a paracentesis. The tension was reduced to 30 mm. Hg (Schiötz), and fresh hemorrhages on the detachment were seen forward on the temporal side. The detachment had a dark-gray appearance. A tumor was suspected. Transillumination was questionable. The Mantoux test was negative, the blood sugar normal. The blood count was essentially negative. Medical examination and X-ray studies were negative.

Discussion. Dr. Sigmund Agatston said that the first time he saw the patient, the fundus showed an irregular retinal detachment, not characteristic of a tumor. The vitreous was loaded with opacities. A tumor was suspected, although the condition seemed to be an inflammatory process. After paracentesis, there was considerable hemorrhage in the retina. The ocular condition should be treated as a case of neoplasm, and the eye enucleated.

Brittain F. Payne,
Secretary.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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WHICH CONTACT LENS?

Readers of the paper by Nelson which appears on page 775 of this issue of the American Journal of Ophthalmology will be interested to compare Nelson's experience and conclusions with those of C. H. Sattler, of Königsberg, Prussia (Klinische Monatsblätter für Augenheilkunde, 1938, volume 100, page 172).

Both writers have had wide experience with several types of contact lens. (Nelson was for many years at Rostock, Germany.) Nelson has apparently been converted to the exclusive use of the Müller-Welt type of contact lens, which combines a spherically ground optic or corneal part with an aspherical scleral part. Sattler, who has fitted contact glasses to over 200 patients in the past seven or eight years, still finds the Zeiss glass with a corneal radius of 7.5 to 8.5 mm. satisfactory in a greater number of cases than the afocal contact glasses.

Both authors point out that there are a good many patients who cannot wear contact lenses whose scleral or haptic (clinging) part has a spherical curvature, for the simple reason that these patients' scleras are not spherical but have one decidedly flatter and an opposite decidedly more convex meridian, analogous to sharp astigmatic inequalities in corneal curvature.

Sattler gives a good short description of the Dallos technique for making a cast of the eye from which may be manufactured a contact glass suitable for the individual patient. This procedure, while theoretically the best, is difficult in practice. First a suitable contact glass must be filled with a hydrocolloid substance

which has been boiled and then cooled to a temperature of about 104°F., when it has the consistency of a homogeneous paste. This mass, in its contact-glass container, is placed under the lids and against the cocainized eyeball. From the negative mold thus obtained a positive is prepared with another plastic substance; from this positive again a plaster cast, then a metal positive, and finally a glass negative is made. This glass negative is tested in contact with the patient's eye, and the spots which press excessively on the eye are polished with a polishing machine. After several new glasses of this kind have been prepared and approximate perfection has been reached, the patient's spherical correction is ground into the corneal curvature of the glass.

Sattler had 10 patients who obtained excellent results from this tedious procedure, but "the glass usually went backward and forward repeatedly between Budapest [Dallos] and Königsberg [Sattler]." Problems of international exchange were involved! Dallos has since discontinued this work and has moved to London! Not an encouraging record!

Sattler finds that contact glasses with a corneal radius of 7.5 to 8.5 mm. are generally better tolerated than those with a longer or shorter radius. A diameter of 22 mm. for the whole glass is better tolerated, in his experience, than the usual diameter of 20 mm.

Nelson remarks that "patients like to see the immediate effect as to visual acuity." Sattler is somewhat less emphatic as to this point. To show the patient what the contact glass will do, he fits immediately a Zeiss glass with a corneal radius of 8 mm., without local anesthesia, and with as good an optical correction as possible, and sends the patient away wearing the glass and with instruction to return if it begins to irritate. If any disturbance develops, he tries various haptic radii at 0.25-mm. intervals without in a preliminary way laying any emphasis on the optical correction, and also tries optical radii of 7.5 and 8.5 mm., and glasses of 22-mm. diameter. He never orders a contact lens unless the patient has shown his ability to wear it without trouble for at least five hours. In 74 out of 96 Zeiss glasses ordered, the most satisfactory haptic or scleral radius was 12 mm.

Sattler points out that the aspherical Müller-Welt glass does not conform so well with the movements of the eye as does the Zeiss glass. The former, however, has the advantage that it is less prone to cause a veil before the sight, that after rinsing it may immediately be reintroduced without the use of any solution, and that it can be taken out without a sucker. A one-armed man was able unaided to take out his Müller-Welt glass, a feat which was impossible with the Zeiss glass.

Various supplemental possibilities in the use of contact lenses are pointed out or suggested by Nelson and Sattler. The former thinks it may be practicable to incorporate in the contact lens a correction for aniseikonia. Both writers agree that at least some patients with one normal and one aphakic eye can obtain binocular vision by correcting the aphakia with a contact glass. Sattler has used a contact lens as the optical end of a telescopic lens-system, the object glass consisting of a spectacle lens.

At the present time most American ophthalmologists are probably far from realizing the full possibilities for application of the contact lens. It may be that the fact that Americans are more tolerant than Europeans toward the wearing of spectacles will limit the popularity of contact lenses on this side of the Atlantic. One obstacle to their general employ-

ment is likely to be found in the expense involved in the purchase, not merely of contact lenses by the patient, but of the outfit which must be acquired by the physician who desires to prescribe such lenses for his patients. Nelson remarks: "It is possible to fit patients satisfactorily by means of a set of at least 20 trial contact lenses, with the further help of the ordinary trial lenses placed in front of the eye, so that the necessary refractive power in the contact lenses may be ordered." (But the Müller-Welt lenses have to be ordered individually from Germany.) Yet he adds: "A set of about 120 different lenses will probably be sufficient" for use by the ophthalmologist who undertakes the fitting of contact lenses and wishes to be able to show his patients the immediate effect of the contact lens as to visual acuity.

The difficulty of expense may be overcome either by leaving this work to a single practitioner in each community, or by the local eye society undertaking to purchase the necessary outfit for loan to its members. As regards the Zeiss contact lenses a trial of the latter method has been in effect for several years in the State of Colorado.

W. H. Crisp.

PREPARATION FOR OPHTHALMIC PRACTICE

In the rapid multiplication of examining boards and graduate courses of study, ophthalmology has taken a leading place. But in some directions its progress has not been what might reasonably be expected. Anatomy and physiology, acquaintance with the normal body and its life processes are the foundations of scientific medicine. The possession of a medical degree gives assurance that the regular medical course has been studied. But in the undergraduate medical schools these subjects are not taught as the student of ophthalmology needs to know them. They have been taught to meet the needs of the general practitioner, the surgeon, the internist, the neurologist, or the specialist in dietetics, or diseases of the heart and lungs.

Anatomy is often taught and demonstrated by one who is looking forward to the general practice of surgery, or the surgery of the central nervous system, the neck, the abdomen, or other particular parts. Physiology has been taught by those who appreciate the importance of digestion, respiration, circulation of the blood, and functions of the central nervous system, as these need to be understood by general practitioners and specialists in other branches. Often advanced courses are given in surgical anatomy, or biochemistry and the physiology of digestion. But rarely has the kind of instruction been given on the anatomy and physiology of the eye that is needed by the ophthalmologist. Graduate courses in ophthalmology have assumed that the graduate in medicine had the necessary acquaintance with anatomy and physiology to profit by instruction in surgical and clinical ophthalmology. Often this has not been the case. Professors of diseases of the eye have often acquired their professional standing by way of clinical ophthalmology or operative surgery without being grounded in the needed basis of ocular anatomy and physiology.

This need not continue. A goodly number of medical schools are offering graduate work in ophthalmology; and they have the requisite facilities for teaching the anatomy and physiology of the eye. But the deans and executive faculties of medical schools have lived in the tradition of a former generation, in which ophthalmology was not really a part of

medicine and surgery, for which they felt responsibility and a duty to provide basic instruction. While offering courses on surgical anatomy, biochemistry, and bacteriology, they have assumed that ophthalmology could go on without surgical anatomy of the eye, or understanding of the special metabolism of its transparent media.

A beginning in the acquisition of basic instruction for ophthalmology can best be made in the graduate courses that are being arranged in different parts of the country. The men who have gone into practice have come to feel defects in their preliminary education; especially those who have located in small cities, where they have little contact with their colleagues, interested in the same line of work. The anatomy of the eye may be studied and taught without the complete facilities of a dissecting room. The basic facts of refraction may be studied, experimentally, with a source of light and the lenses and prisms of a trial case. The ophthalmologist may study the physiology of ocular refraction and its aberrations in his own eyes. Brief graduate courses can teach practical methods for such studies. But it is as much the duty of those who give graduate instruction to offer these opportunities, as it is the duty of a medical school to give instruction in general anatomy and physiology. It is best for every eye physician to understand the surgical anatomy and physiology of the eye; and the aberrations of his own eyes, and their movements. Any patient may want answers to questions that arise in his mind from things he notices, when using his eyes.

Edward Jackson.

THE SAN FRANCISCO MEETINGS

The meeting of the American Ophthalmological Society was held on the Pacific coast for the first time in its long existence. Every one present will testify to the success of the undertaking. Fear of a poor attendance has been the principal inhibitory factor to venturing so far from the Eastern seaboard where the bulk of its members live. As evidenced by this meeting this is not to be dreaded in future, for 66 members and more than 75 guests were registered, comparing favorably with the usual registration of about 75 members and only a few guests. The Mark Hopkins Hotel, selected for not only this meeting but also for that of the Research Association, and serving, as well, as headquarters for the ophthalmic section, proved in every way satisfactory. Located on Nob Hill, it overlooks the city with its surrounding hills and the most beautiful harbor in the United States.

There is a real advantage, especially for those who live far from the customary meeting places, in being able to attend two or even three meetings on the same trip, although the combined dosage of 45 papers is almost too much for assimilation. Such a long program does tend to make a pretty dreary outlook for a good attendance on the last day of the meeting. This is hard on the essayists listed towards the finis of the program and presents a problem to the program committee as to whether they should place the most popular speakers near the end, hoping that the interest aroused by them will hold the crowd through the entire meeting, or accept the more obvious course of placing them on the first day, on which the number present is normally large, and let the attendance dwindle rapidly thereafter.

San Francisco welcomed her guests royally. Entertainments were lavish and numerous. The city is so frequented by tourists that many and divers cafés flourish. One must hope that he is not

allergic to sea food, although if he is not before he goes to the convention, he is in a fair way to becoming so ere he departs.

To pick out for discussion on the basis of merit a few papers from the 45 that were read is scarcely possible. Perhaps the most thrilling was the presentation of the effect of sulfanilamide on trachoma. The results as told by the authors and illustrated with slides by the discussor really surpass belief. Although a visit to the Navajo country immediately after the meeting indicated a somewhat less favorable effect on 40 patients treated in that region, and first improvements may be fleeting, the fact that inclusion bodies, which were numerous before the drug was used, could not be found at the end of the treatment, which consisted of internal medication only, indicates that the effect is almost surely due to the action on the organism and lends hope as to the permanency of the improvement. If to the dramatic and rather convincing evidence in regard to the etiology of trachoma, brought out experimentally in the last five or six years, could now be added a cure for this disease, these years would hold something in ophthalmology about which to boast. It is interesting that two drugs—tartar emetic, as described in the last issue of this Journal, and sulfanilamide, as presented at this meeting—each showing a remarkable effect on trachoma, should come to light within so short a period of one another.

Two interesting operations, one for ptosis and one for a spastic entropion, utilizing strips from the orbicularis, were cleverly conceived and appeared so simple that one is tempted to try them at the first opportunity. Further light was thrown on the puzzle of aniseikonia, but much more evidence will have to be accumulated before it can be properly evaluated.

We were told again about the operation of incision of the angle of the anterior chamber, under direct vision, for glaucoma. To some was given an opportunity to see patients on whom this had been done. Apparently the operation deserves a full trial by those who have ample surgical opportunities, and if it proves effectual there still remains the question as to its practicability in the hands of the average ophthalmologist before it is generally accepted as one of the universal methods of combating glaucoma.

Papers read before the Research Society were unusually good; somewhat difficult to follow at times, and rather tiring before the eighth was concluded at five o'clock. But such is the nature of research, and it is well to have an organization which will be attended by those who are interested in ophthalmic investigations, for the presentation of the results of laboratory work.

Except for those giving examinations to candidates for the Board, Sunday and Monday were holidays. This gave an opportunity for a hurried visit to the Yosemite and its big trees, and the redwoods, or the homes of friends located in the hills about the city.

Among officers elected were, for president of the American Ophthalmological Society, Dr. Frederick T. Tooke; for vice-president, Dr. E. V. L. Brown. Dr. Sylvester Judd Beach was chosen chairman of the Section on Ophthalmology. Hot Springs, Virginia, was selected for the next meeting of the American Ophthalmological Society, and St. Louis for the American Medical Society.

It is good to go to different places, and it is surely an advantage to be able to combine several meetings in one. The 1938 meetings in San Francisco will be remembered as unusually pleasant and successful.

Lawrence T. Post.

BOOK NOTICES

O DESCOLAMENTO DA RETINA E SEU TRATAMENTO (Detachment of the retina and its treatment). By A. Borges de Souza, Professor of Ophthalmology in the Medical Faculty of Lisbon, etc. 123 pages, paper covers, no illustrations. Livraria Classica Editora, Lisbon, 1937. Price not given.

This volume (in Portuguese) is an excellent review of the literature of retinal detachment, as regards history, etiology, and treatment; together with some statistics as to the incidence of the condition in four clinics and hospitals of Lisbon, and as to the results of surgical treatment by recent methods. Illustrative clinical and operative cases are described in detail, with discussion as to the complications or causes of failure.

Among a total clinical material of 54,681 patients, 501 cases of retinal detachment were encountered. Myopia of 3 D. or more had existed in 287 cases, of from 4 to 9 D. in 129 cases, and of 10 D. or more in 113 cases.

The author operated on 128 cases of detachment in the course of three years. After stating the percentage of cures at 70 percent, he proceeds to explain why it would be advisable to omit 13 cases from the list of those operated upon (desperate risks, refused second operation, and so on), thus increasing the percentage of cures to 78. Among those listed as cured, 5 eyes obtained visual acuity of 1; 4, of 2/3; 13, of 1/2; 11, of 1/3; 15, of 1/4; 16, of 1/6; 9, of 1/8; 7, of 1/10; and 8, less than 1/10.

Permanence of cure was verified by direct examination or information in 28 cases, for more than one year; 11, more than 9 months; 10, more than 6 months; 7, more than 4 months; 7, more than 3 months; and 12, more than 2 months. In recent years the author has used exclusively diathermy coagulation, the technique for which he describes in detail.

W. H. Crisp.

ANAGLYPHS (THEIR USE IN ORTHOPTIC TRAINING). By Mary Dobson, M.D. C. Tingling & Co. Ltd., London. Price not stated.

Dr. Dobson has very ingeniously devised a new method of orthoptic training applicable in certain cases of manifest strabismus and in almost all types of heterophoria. It is accomplished by the viewing of anaglyphs through a bichromatic screen.

The first chapter of the book is devoted to the explanation of stereoscopic and pseudoscopic vision. These phenomena are quite complicated, but through a series of simple, illustrated experiments an adequate understanding is easily obtained. The ordinary stereoscope is composed of a pair of eyepieces, their centers separated by the average pupillary distance of 60 millimeters. A glass containing a 5-diopter convex lens and a 10$^{\Delta}$ base-out prism is placed in each eyepiece, and a septum between the eyepieces. When a stereogram is set at the focal length of the lenses and viewed through the eyepieces, the eyes are in a state of relative divergence, and the two halves of the stereogram are seen in crossed diplopia. The outer, nonmacular, crossed images are hidden by the septum. The inner, homonymous, macular images are fused and the resulting single image appears to be projected behind the plane of the stereogram. This phenomenon is known as stereoscopy.

If the lenses and the prisms are removed from the stereoscope and the septum replaced by one containing a central perforation through which the left picture is seen by the right eye and vice versa (crossed diplopia), the pictures

are fused by convergence and appear to be projected in front of the plane of the stereogram (pseudoscopy).

Following the explanation of stereopsis, Dr. Dobson describes the anaglyph in detail. To summarize briefly, each picture of the stereoscopic pair is colored in complementary red and green and superimposed so that one pair of corresponding points on the plane of the paper are coincident. All parts behind the plane of the paper are seen by relative divergence, and all parts in front of this plane are seen by convergence when viewed through a screen of complementary colors. In other words, the pictures are overlapped in such a fashion that when viewed through a bichromatic screen, parts of the picture are seen in apparent crossed diplopia and other parts are seen in apparent homonymous diplopia. In order to fuse the crossed images, a convergence effort is required, and conversely, a divergence effort is necessary to fuse the homonymous images. The fused picture is seen in monochrome. The unwanted images are rendered invisible by the screen.

By constructing a series of anaglyphs the stereoscopic pairs of which were separated by known distances, Dr. Dobson was able to compute the amount of convergence or divergence in prism diopters required to fuse each stereoscopic pair.

Actual training is initiated by viewing through the bichromatic screen such a series of anaglyphs, the separation of the images of each successive picture being greater or less, according to the type of training desired. If further effect is needed, prisms with bases in or out can be placed before the eyes.

Besides being a means of treatment in all cases of heterophoria (but obviously only cases of strabismus having binocular macular perception, that is, first degree fusion, can be trained), the anaglyphs can be used as an aid in the diagnosis of suspension, hyperphoria, and cyclophoria.

The idea is a fascinating one, and the actual technique is extremely simple.

The anaglyph can be used only where good, bright illumination is available, for much of the light is cut out by the bichromatic spectacles, and the desired effect is almost lost in subdued illumination.

In the opinion of this reviewer the greatest benefit from this device will be obtained in the treatment of the heterophorias, the manifest squints being somewhat uncertain regardless of the type of orthoptic training used; also as a periodic home treatment for the patient whose muscle imbalance has been corrected or improved by other means. Lastly, it is a compact, inexpensive, easily operated addition to the orthoptist's armamentarium.

W. H. Meinberg.

AN INTRODUCTION TO THE MATHEMATICS OF OPHTHALMIC OPTICS. By Paul Boeder, Ph.D. Clothbound, 224 pages. Published by the Distinguished Service Foundation of Optometry, Fall River, Mass., 1937. Price not stated.

Here is a text on elemental optics that deals with mathematics in such a way that the text is actually good reading. The author acknowledges that the average reader must review mathematics back to his early arithmetic. This is done in good taste and most readers will appreciate a substantial reconsideration of the handling of fractions.

Quickly one is led into algebra and geometry with a final touch on trigonometry. These are all so intimately related and so clearly written the reader is sure to enjoy the restoration of distant

mathematical memories. Optical principles and applications are indicated throughout.

Further, the writer's enthusiasm is imparted to the reader to such an extent that he will be led to perform some of the suggestions outlined. The greatest usefulness of the book no doubt will be to postgraduate students in ophthalmology, for it will make possible an enjoyable understanding of the subject of optics. H. Rommel Hildreth.

GIZA MEMORIAL OPHTHALMIC LABORATORY, Eleventh annual report, 1936. 147 pages, illustrated. Printed by Schindler's Press, Cairo, 1937. Price 25 P. T.

The Giza Memorial Ophthalmic Laboratory in Egypt is a central pathological laboratory for the Government Ophthalmic Hospitals both permanent and traveling. It standardizes the ophthalmic training of all candidates for the Government Ophthalmic Service of Egypt by giving intensive postgraduate courses which must be passed by the candidates before their appointment to the Government Eye Service or before they are allowed to enter the private practice of ophthalmology.

During the year 1936, 554 specimens were examined. Short reports are given on interesting cases, including the following: hyaline bodies in caruncle, angioma of caruncle, epidermoid carcinoma of caruncle, ossification of tarsus in trachoma, heterotopic cartilage in conjunctiva, epidermoid carcinoma of palpebral conjunctiva, sarcoma of palpebral conjunctiva, bilharzial granuloma of bulbar conjunctiva, epidermoid carcinoma of bulbar conjunctiva, intra-epidermal squamous-cell carcinoma of bulbar conjunctiva, sarcoma of bulbar conjunctiva, epidermoid carcinoma of limbus, metastatic cerebral tumor with choked disc, orbital giant-cell tumor of bone, and mixed-cell sarcoma of the orbit.

Tuberculous lesions of the eye are rare in Egypt, but four cases were seen during 1936, including a tuberculous ulcer of the eyelid in a girl of seven years, tuberculosis of the conjunctiva in a boy aged four years, and bilateral tuberculosis of the lacrimal gland in females aged eighteen and twenty years.

Lawrence G. Dunlap.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education and history
19. Anatomy, embryology, and comparative ophthalmology

5

CONJUNCTIVA

Danilewsky, I. A., and Kaminsky, P. G. **Allergic reaction in trachoma.** Ann. d'Ocul., 1938, v. 175, March, pp. 245-253.

The authors review the literature on allergy and immunity in trachoma. Using intradermally a preparation from trachomatous conjunctivas, they obtained more severe and lasting cutaneous reactions in patients with trachoma than in those without. The results offer additional evidence of the presence of allergy in trachoma and may point the way to further diagnostic, prognostic, and therapeutic procedures.

John M. McLean.

Froge, Poursines, and Chiniara. **Reflections on the limbal form of vernal catarrh.** Ann. d'Ocul., 1938, v. 175, March, pp. 236-244.

The limbal form of vernal catarrh has a well known clinical picture. It is possible to separate cases in adults from cases in children and adolescents, the former having predominant vascular reaction, the latter, predominantly local tissue edema. The adult form is certainly allergic. The younger forms resemble phlyctenular keratoconjunctivitis and are often activated by exposure to strong sunlight. John M. McLean.

Gala, A. **Pemphigus of the conjunctiva.** Ceskoslovenska Oft., 1937, v. 3, no. 4, pp. 263-268. (See Amer. Jour. Ophth., 1937, v. 20, Dec., p. 1278.)

Havel, Jaroslav. **Blennorrheal conjunctivitis in the provinces.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 282-286.

One hundred and twenty-three cases were treated, 120 in children, and three in adults. The provincial clinic is situated in an agricultural district. Of the 123 cases, 41 were gonococcal in origin. All the ulcers and perforations were from a positive childbed infection. Some infants reached the clinic with both corneas perforated. In five cases the ulcers were such that it was impossible to prevent perforation. The blennorrhea due to pneumococci, streptococci, staphylococci, or B. coli had a course wholly benign though sometimes stormy. The mildest course was that of

inclusion blennorrhea. A law is recommended to compel the use of the Credé method. Georgiana D. Theobald.

Jebavy, Jan. **Blennorrheal conjunctivitis; statistical report.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 273-282.

During the years 1929-1936, 456 cases of blennorrheal conjunctivitis were treated at the Brno Eye Clinic. These were classified as due to (1) gonococcal, (2) inclusion blennorrhea, and (3) specific bacterial infections such as staphylococcal, streptococcal, pneumococcal, and so on. It was found that gonorrheal cases decreased in number with the years. Only three cases developed corneal ulcers, and these were marasmic cases, artificially fed: two of these children died of general atrophy. Milk injections were used in all cases in conjunction with local treatment. The author attributes the good results obtained to early treatment.

Georgiana D. Theobald.

Jourdan, Henri. **Treatment of trachoma by local autoserotherapy.** Ann. d'Ocul., 1938, v. 175, March, pp. 254-258.

Jourdan has adopted Angelucci's method of local autoserotherapy in trachoma. The patient's blood is drawn, centrifuged, tyndalized, and stored in sterile ampoules. Injection of 0.5 c.c. subconjunctivally two or three times a week produced improvement in eight cases. The author regrets that his patients were not followed long enough to judge the permanence of the improvement. John M. McLean.

Julianelle, L. A., and Harrison, R. W. **Studies in the infectivity of trachoma. 8. Biology of the infectious agent.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 529-535.

Keller, P. **Contribution to the study of trachoma in Indo-China.** Arch. d'Opht.-Rev. gén. d'Opht., 1938, v. 2, Jan., p. 1.

This is a clinical study based on sixteen years experience in almost 200,000 cases. The earlier patients were treated with zinc sulphate and argyrol only, in order that the author might observe the various stages of the disease without producing scar tissue and distortion by strong chemical substances. He divides trachoma into three stages: (1) the initial or nodular stage, (2) the ulcerative stage, (3) the stage of sclerosis or scar-tissue formation. The nodules begin deep in the chorion and develop upward toward the epithelium of the conjunctiva as well as downward into the tarsus, breaking through the epithelium and forming small ulcers which heal and produce the stage of scar formation. The author believes that trachomatous pannus is a fact only in interstitial keratitis and is not of trachomatous origin but specific. If a trachomatous individual has normal corneal sensitivity there will be no corneal complication even if entropion or trichiasis is present. Individuals with pannus and iritis are treated with arsenic, mercury, and bismuth. More than five to six thousand patients have been treated in this fashion with excellent results. (Illustrations.) Derrick Vail.

Klauber, E. **Pseudotumors of the conjunctiva containing foreign bodies.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 312-314.

The author reports three cases: (1) A conjunctival granuloma, the size of a pea, contained a wooden splinter and an eyelash. There had been a previous injury. (2) In a 64-year-old female, partial resection and plastic operation of the left lower lid were done on account

of an epithelioma. Healing was uneventful. The patient returned later with a granuloma which contained vaseline, derived from the ointment used postoperatively. (3) A subconjunctival tumor, which according to the case history contained a sliver of wood, was a sarcoma without any foreign body.

Georgiana D. Theobald.

Kolacny, Jaroslav. **Pseudomembranous conjunctivitis.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 269-273.

At the eye clinic in Bratislava, during the past ten years, 41 cases of pseudomembranous conjunctivitis were treated. On the average the affection lasted twenty days. Twenty-three cases were in patients twelve months of age; eleven cases varied from one to three years; seven cases were up to six years of age. Some corneal complications occurred, almost all light. In only one case had complete destruction of the cornea occurred, leading to enucleation. Asthenia due to malnutrition is very important in causation. The following organisms were found: pneumococci in 25 percent of the cases; gram-positive cocci in 15 percent; gonococci in 10 percent. In 50 percent the result of bacteriologic examination was negative, and the etiology of the disease remains inexplicable.

In therapy, milk injections were very efficacious.

Georgiana D. Theobald.

Meissner, W. **On the treatment of keratoconjunctivitis sicca.** Zeit. f. Augenh., 1938, v. 94, Feb., p. 129.

Since the fibrolysin solution which has been used with satisfaction in keratoconjunctivitis sicca is not only expensive but dispensed in sealed ampoules and therefore difficult for the patient to use, the author sought a substitute. Fibrolysin is a mixture of thiosinamin and sodium salicylate. Its effectiveness probably depends on the keratolytic action of the salicylic acid. Meissner treated the rare true keratoconjunctivitis sicca and a number of chronic conjunctival inflammations in the aged (with relatively dry eyes) with a 2-percent solution of sodium salicylate instilled several times daily. The action was exactly like that of fibrolysin.

F. Herbert Haessler.

Michal, F. V. **Bacterial findings in acute conjunctivitis.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 286-290.

The bacteriologic findings in sixty cases of acute conjunctivitis were as follows: staphylococcus pyogenes aureus, 21; pneumococcus, 11; staphylococcus pyogenes albus, 11, five of which had hemolytic properties; Koch-Weeks bacillus, 2; zur Nedden's bacillus, 2; Morax-Axenfeld diplobacillus, 2; xerosis bacillus, 7; hemolytic streptococcus and streptococcus aureus, 2; micrococcus albus, 3.

The most severe conjunctivitis was due to the hemolytic streptococcus. The most acute cases occurred in the cool spring and fall months. The lowest number of cases occurred in the hot summer months.

Georgiana D. Theobald.

Mitzkevich, L. D. **Application of strong solutions of zinc sulphate in Morax-Axenfeld conjunctivitis.** Viestnik Opht., 1937, v. 11, pt. 4, p. 554.

The author uses applications of 3 to 5-percent zinc sulphate to the everted lids, with better results than those afforded by weak solutions.

Ray K. Daily.

Rapisarda, Dante. **Bacteriologic studies of ultramicroscopic bodies in tra-**

choma. Rassegna Ital. d'Ottal., 1937, v. 6, Nov-Dec., p. 686.

Rapisarda reviews the researches upon the various microscopic bodies found in trachoma, from the work of Halberstaedter and Prowazek to the present time. The present article reports efforts to confirm the finding of rickettsia bodies in trachoma, as reported by various workers. The material was taken from the follicles and from epithelial scrapings in fresh cases of trachoma. In part the author confirms these findings, but he concludes it is impossible to distinguish the bodies by simple morphologic criteria from other formations. (4 figures.)

Eugene M. Blake.

Rostkowski, Louis. **Does follicular conjunctivitis present a particular morbidity?** Rev. Internat. du Trachome, 1937, v. 14, Oct., p. 267.

The author calls attention to the fact that the conjunctival lymph follicles are hypertrophied by reaction to a number of different causes. Follicular conjunctivitis is a misnomer, and the etiologic diagnosis should always be given.

J. Wesley McKinney.

Rozner, E., and Kardos, J. **Herpetic infection in trachoma.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 295-310. (See Section 6, Cornea and sclera.)

Sabata, Jan. **Tularemia in southern Moravia.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 217-222.

Three cases of oculoglandular tularemia were treated. In all three cases there was a sudden onset. The agglutination test for tularemia was highly positive. No case was fatal.

Georgiana D. Theobald.

Trapezontzeva, E. **Rickettsia in trachoma.** Viestnik Opht., 1937, v. 11, pt. 5, p. 702.

A detailed description of the laboratory technique of inoculating lice with the contents of the trachoma follicle, and a review of the work of Cuénod and Nataf, who attribute the disease to rickettsia which they demonstrated in trachoma follicles and trachomatous tissue.

Ray K. Daily.

Vejvodsky. **Conjunctival hemorrhages, in a nursling.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 311-312.

The author observed a conjunctival hemorrhage in a six-weeks-old baby, from a 2 by 1 mm. spot on the lower lid. The blood picture was normal. The bleeding was checked after several days, but recurred. A bleeding spot occurred on the breast and on one heel. The child was given injections of its mother's blood, gelatin, and horse serum; also some vitamin preparations. After five days the bleeding ceased. The child died within a year of pneumonia.

Georgiana D. Theobald.

6

CORNEA AND SCLERA

Angius, Tullio. **Scleral cysts of traumatic origin.** Rassegna Ital. d'Ottal., 1937, v. 6, Nov.-Dec., p. 655.

The author discusses the general subject of scleral cysts and reviews the literature very completely. He then describes two cases, one in a girl following a penetrating wound at the limbus, the other in a man with a wound outside the limbus. In the former case there were three cysts, in the second case one. Both were excised and the wounds closed with good results. In the first case the epithelial lining apparently arose from corneal epithelium, while in the second case it developed from

conjunctival epithelium. The histology of the cysts is carefully described. True scleral cysts are rare. (8 figures.)

Eugene M. Blake.

Cole, H. N., and others. **Late prenatal syphilis with special reference to interstitial keratitis, its prevention and treatment.** Archives Dermat. and Syph., 1937, v. 35, April, p. 563.

Interstitial keratitis was found in approximately one third of 1,010 cases of late prenatal syphilis. The patients were at least two years old when admitted to the clinic. Satisfactory clinical outcome decreased if the treatment was delayed until chronic manifestations occurred or healed residual scars appeared. Patients under observation and treatment before the age of fifteen years showed a better clinical response.

Late prenatal syphilis subjects the patient continuously to the risk of interstitial keratitis up to the age of 25 years unless adequately treated. Sixteen injections of an arsenical and 31 injections, or weeks of mercury rubs, are advised. The best prophylactic for such keratitis is adequate continuous therapy for prenatal lues. Involvement of the second eye in the interstitial keratitis may occur despite early treatment. In chronic and relapsing interstitial keratitis, administration of iodides, and fever and foreign-protein therapy, were found to be valuable adjuncts.

F. M. Crage.

Dering, S. A. **The treatment of purulent keratitis with ionization.** Viestnik Opht., 1937, v. 11, pt. 4, p. 564.

The author is very enthusiastic about this form of therapy, and he reports twenty brief clinical histories to support his position. Ray K. Daily.

Hnikova, Olga. **Quinine therapy in corneal affections.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 251-255.

Since the beginning of the year 1936, thirteen patients with luetic interstitial keratitis have been treated locally with a 15 to 20 percent concentration of quinine hydrochloride in conjunction with general antiluetic treatment. It is claimed that the treatment time is reduced and resulting visual acuity greater than under other therapy. This form of treatment should always be under control, as many patients have an allergy to quinine which is manifested by symptoms ranging from severe hyperemia to necrosis.

Georgiana D. Theobald.

Katznelson, A. B. **Pathogenesis of fascicular keratitis.** Viestnik Opht., 1937, v. 11, pt. 4, p. 512.

The author believes that fascicular keratitis represents a tuberculous allergic reaction. To prove his contention he reviews the literature and reports of his own cases. Ray K. Daily.

McKinney, J. W. **Transplantation of the human cornea.** Southern Med. Jour., 1937, v. 30, Aug., p. 779.

A detailed review of the development of this type of work is given, followed by a description of Castroviejo's technique. The author reports two cases, one in which the final vision is 4/200 and the other 10/200. He concludes that if suitable technique is used we may expect successful grafting in three out of four of favorable cases and one out of three of unfavorable cases. Heterogenous grafts have been uniformly unsuccessful. (13 figures, 24 references.)

Ralph W. Danielson.

Mikhaelin, R. X. and Zarchi, B. H. **The effect of traumatism of peripheral nerves on the course of corneal infection.** Viestnik Opht., 1937, v. 11, pt. 5, p. 611.

A review of the literature on the role of the nervous system in ocular diseases, with particular reference to the work of Speranski. The authors' experiments on rabbits consisted of determining the effect of section of the trigeminal or ischiatic nerves on the course of experimental corneal ulcers. The results show that preliminary traumatism of the peripheral nerves shortened the course of the disease and ameliorated the symptoms. Section of the nerves simultaneous with corneal infection aggravated the corneal process.

Ray K. Daily.

Nechaeva, E. A. **Unilateral lattice-shaped corneal opacity.** Viestnik Opht., 1937, v. 11, pt. 5, p. 639.

A report of lattice-shaped corneal dystrophy in two sisters, father, and paternal grandmother, and a review of the literature on the disease. (Illustration.)

Ray K. Daily.

Nižetić, Z. **Hand trephine for corneal transplants.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 258.

The author gives his reasons for preferring a hand trephine to one that is actuated by a spring or an electric motor and describes one constructed according to his specifications which he finds entirely satisfactory for keratoplasty.

F. Herbert Haessler.

Odeneal, T. H. **Thermophore therapy of a case of keratitis.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 546-548.

Rozner, E., and Kardos, J. **Herpetic infection in trachoma.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 295-310.

Herpetic involvement of a trachomatous cornea is very stubborn, because of the virus infection on an already diseased cornea, with low resistance, and injured nerve endings resulting in lowered sensibility. Patients with chronic recurrent pannus are more prone to acquire herpes than patients with acute trachoma. The herpes occurs with infections of the upper respiratory system, and is prone to recur.

Georgiana D. Theobald.

Rubbrecht, R. **The surgical treatment of affections of the cornea.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 56.

The author has had excellent results with the conjunctival flap in the treatment of corneal lesions, as reported in 1932 before the French Society of Ophthalmology. He has modified the flap and illustrates the steps of the operation with five figures in the text; the essential modification consisting in complete excision of diseased tissue with a curved lance before applying the flap. He reports numerous illustrative cases. The method is useful in trachomatous pannus and in recurrent pterygium.

J. B. Thomas.

Vanysek, Jan. **The importance of vitamin A in regeneration of corneal tissue.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 189-200.

Experiments on rabbits indicate that: a definite dose of carotene given by mouth (a dose equivalent to that for increasing the weight of the animal) secures more rapid recovery from artificial lesions. Affections of the cornea heal a little less quickly with applications of cod-liver oil than with a substance containing vitamin A. Application of carotene in solution, directly into the conjunctival sac, gives no result whatever. A powerful dose of carotene by mouth (in the dose for reducing weight) arrests recovery from corneal affections.

In certain non-healing clinical cases,

recovery was stimulated by carotene given orally.

Georgiana D. Theobald.

Veis, A. S. **Treatment of scrofulous keratoconjunctivitis with Ponndorf's method.** Viestnik Opht., 1937, v. 11, pt. 4, p. 542.

On the basis of results obtained in 34 cases the author concludes that this method gives satisfactory results in the majority of cases, but does not prevent recurrence. He retracts his former statement that the treatment is always safe, and urges that the treatment be administered cautiously, in coöperation with an internist. He believes that the method could be made safe by beginning with weak solutions and increasing their strength gradually, as is done in subcutaneous administration of tuberculin. Ray K. Daily.

Zatz, L. B. **Speranski's blockade in corneal disease.** Viestnik Opht., 1937, v. 11, pt. 5, p. 623.

Thirteen brief clinical reports of cases in which a novocaine pararenal blockade by Speranski's method was used as one of the therapeutic measures. The conclusions are that the procedure is harmless; that it is ineffective in serpigenous ulcer, but acts favorably in angioneurotic processes.

Ray K. Daily.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Alajouanine, T., and Morax, P. V. **The tonic pupil and Adie's syndrome.** Ann. d'Ocul., 1938, v. 175, March, pp. 202-236.

Adie's syndrome consists of tonic pupil, loss of tendon reflexes, and various sympathetic abnormalities, without syphilis. The literature is confused and includes three general groups: tonic pupils without other neurologic signs, tonic pupils with areflexia, or isolated areflexia. Out of 183 cases reported, the authors find 92 suitable for analysis and, adding eight cases of their own, draw certain conclusions.

Of the tonic pupils 77 percent occur in females, and 83 percent are unilateral. The tonic pupil is variable in size, often occurring in mydriasis, never in miosis. The pupil is often irregular or eccentric. Both direct and concentric reaction to light are lost. There is a slow but strong reaction to convergence, with a rapid and complete recovery, often excessive. The Piltz-Westphal reaction (contraction on forceful closure of the lids) is usually absent. Tournay's phenomenon (dilatation on abduction) is usually absent. Reaction to painful stimuli is usually absent. Contraction on stimulation of the cornea is usually followed by tonic dilatation. Hippus sometimes occurs. The reactions to mydriatic or miotic drugs are normal. Extrapupillary signs include accommodative difficulties, ptosis, iris atrophy, hemicrania, and loss of the oculocardiac reflex. Other neurological signs which may be found are loss of deep tendon reflexes, normal cerebrospinal fluid, and sympathetic abnormalities. The authors believe that some of the cases are due to hereditary or latent syphilis with negative serologic reactions. John M. McLean.

Appelmans, M. **Intraocular ossification. Radiographic examination and histopathology.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 88.

The author reports two cases illustrated by two plates. (17 references.)

Cardello, Giovanni. **Hypertensive (glaucomatous) iridocyclitis.** Rassegna

Ital. d'Ottal., 1937, v. 6, Nov.-Dec., p. 698.

Seven cases of iridocyclitis complicated by glaucoma are related in detail. In six cases, while no specific etiologic factor could be found, there was some definite pathology such as accessory sinusitis or healed pulmonary tuberculosis. In one case no abnormal physical state could be made out. The early use of miotics is stressed, to be followed by atropine as soon as possible. The author discusses the possible relationship of such cases to simple glaucoma.

Eugene M. Blake.

Coppez, H., and Du Jardin, B. **A case of Besnier-Boeck disease or benign lymphogranulomatosis of Schaumann with ocular manifestations.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 39.

Schaumann called this disease complex "benign" to distinguish it from Hodgkin's disease or malignant lymphogranuloma. A woman forty years of age suffered from nodular skin eruptions, high fever, parotiditis, facial paralysis, and uveitis. The etiology is under dispute. Schaumann believes it to be bovine tuberculosis. The authors note that there exists a form of iridochoroiditis, the aspect and evolution of which resemble tuberculous iridochoroiditis, but which differs from the latter in certain very clear characteristics. The localizations of this disease are multiple and variable. If the skin is the seat of election, it is called the disease of Besnier-Boeck. If the uveal tract and the parotid and lacrimal glands are affected, it is the disease of Heerfordt and probably the disease of Mikulicz. Perhaps certain cases of iridochoroiditis without general characteristic symptoms may be detached from the tuberculosis group and connected with the disease under consideration. (5 illustrations, including 2 full-page color plates.)

J. B. Thomas.

Franta, Jiri. **The influence of ascorbic acid (vitamin C) upon the permeability of the hemato-ocular barrier.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 177-189.

In order to ascertain the influence of ascorbic acid (vitamin C) upon the hemato-ocular barrier, the author used the fluorescein test. Fifteen patients were used for this work, and the results compared with previous experiments when no vitamin-C products had been used. The ascorbic acid (as prepared by Merck, "Cebion," and Roche, "Rodoxon") was applied in part locally, by subconjunctival injection, otherwise by intravenous injection. Previous control experiments had been made without using the ascorbic acid. In the first group of four patients, a hypertonic salt solution (5 percent) subconjunctivally was used for control experiment. In these four patients the subconjunctival injections of ascorbic acid accelerated the penetration of fluorescein into the anterior chamber. This acceleration in some cases was at least as great, if not greater than the acceleration occurring after the injections of the hypertonic solutions of NaCl.

In the second group of eleven patients, the intravenous injections of ascorbic acid increased the rapidity of penetration of the fluorescein into the anterior chamber. In four cases this acceleration was considerable, in the other cases the acceleration was less marked, but yet entirely distinct: in a single case the penetration was the same as in the control experiment. Indeed, in cases where the fluorescein penetration had been more rapid in the control cases than in the corresponding normal cases, a very remarkable accel-

eration took place after the application of ascorbic acid in comparison with the control. Georgiana D. Theobald.

Jahnke, Walter. **Experimental investigation on the origin of ectogenic iritis.** Klin. M. f. Augenh., 1938, v. 100, March, p. 362.

Ectogenic iritis, manifested in hyperemia of the iris and exudation of cells and protein into the anterior chamber, frequently accompanies severe inflammations of conjunctiva and cornea. It is frequently ascribed to the chemotactic action of bacterial toxins, but two phenomena make this seem unlikely: (1) Such an iritis may accompany mechanical injury, and (2) it is often limited to a section of iris corresponding to the site of the injury or inflammation in the cornea. If the iris reaction is indeed reflex, a question arises as to which fibers —sympathetic, parasympathetic, or sensory—carry the afferent impulse. In 25 albino rabbits the author cut the ophthalmic division of the trigeminal nerve. The results make it clear that an axon reflex exists which alone is able to produce changes in the anterior chamber, in particular hyperemia of the iris. Since all vasodilatation is accompanied by absolute and relative leucocytosis, the increased cell content of the aqueous may also be ascribed to this axon reflex. F. Herbert Haessler.

Lamb, H. D. **The genesis of the cyclitic membrane.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 503-509; also Trans. Amer. Ophth. Soc., 1937, v. 35, p. 294.

Meyer F. W. **Lymphogranulomatosis benigna (Boeck sarcoid) and iridocyclitis.** Klin. M. f. Augenh., 1938, v. 100, March, p. 377.

The author gives a very detailed account of a patient in whom an extremely malignant intractable bilateral exudative iritis was associated with the benign lymphogranulomatosis. There were many nodules in the skin, and many enlarged lymph nodes, and there were pulmonary lesions. Histologic preparation from an extirpated nodule and a lymph node exhibited the typical picture of benign lymphogranulomatosis with clear tuberculoid structure.
F. Herbert Haessler.

Pritzker, L. V. **Transfusion in uveitis.** Viestnik Opht., 1937, v. 11, pt. 5, p. 695.

A report of nine cases the therapy of which included one or repeated transfusions. The author concludes that the procedure is indicated in difficult cases and in cases of uncertain etiology. In old cases, without light projection and with an invisible fundus, the treatment is ineffective. Ray K. Daily.

Purtscher, Ernst. **The etiology of "spontaneous" choroidal detachment and "serous tenonitis."** Zeit. f. Augenh., 1938, v. 94, Jan., p. 12, and Feb., p. 141. (See Section 13, Eyeball and Orbit.)

8

GLAUCOMA AND OCULAR TENSION

Badot, J. **Hemorrhagic glaucoma. The conservative operations.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 64.

The author reports two cases for which conservative operations failed and enucleation was necessary in the end. J. B. Thomas.

Dashevskii, A. I. **The pilocarpine angioscotometric test for glaucoma.** Viestnik Opht., 1937, v. 11, pt. 4, p. 523.

A tabulated report of the pilocarpine test in cases of established, prodromal, and suspected glaucoma. The author finds that in glaucoma the blind spot

and the angioscotoma diminish in size after instillation of pilocarpine. He considers this an absolute test for glaucoma, more reliable than the Bjerrum scotoma or Seidel step. The diminution of the angioscotoma may be found in cases where the study of the blind spot is negative. Ray K. Daily.

Foster, John. **Artificial glaucomatous halo.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 364.

An even film of lycopodium spores between thin glass plates, as first described by Fraunhöfer in 1850, was made as an example for patients to compare with a possible glaucomatous halo.
Beulah Cushman.

Fritz, A. **The medical treatment of glaucoma.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 77.

The author's observations lead him to state that most of the phenomena of glaucoma are perhaps in the last analysis linked to circumstances of vascular caliber, not to a generalized state of vasodilatation but to a particular state of caliber at certain levels of the arterial tree, with concurrence of factors of general circulation, of vascular structure, and of nerve or hormone influxes from one or the other vegetative system. In discussion, Coppez stated that he was convinced of the inefficacy of medical treatment and that we should insist on the necessity of operation as soon as miotics instilled three times a day failed to reduce the tension to normal. Weekers agreed entirely with this opinion and went further in recommending a slightly hypotonizing operation such as iris inclusion in cases where miotics were needed constantly to maintain normal tension. J. B. Thomas.

Garrow, Alexander. **Exfoliation of the lens capsule in glaucoma.** Brit. Jour. Ophth., 1938, v. 22, April, pp. 214-230.

Fifty-one cases of glaucoma were studied for evidence of exfoliation of the lens capsule. Exfoliation was observed in eight of these cases, and the appearance is described in each case. An excellent description of the slitlamp picture of the condition as generally seen is given. The author draws no definite conclusions on the relationship of these two conditions. (Plates, figures, references.) D. F. Harbridge.

Ivanov, C. H. **Cyclodialysis with posterior sclerectomy.** Viestnik Opht., 1937, v. 11, pt. 4, p. 519.

The author completes the cyclodialysis by excision of a triangular piece of sclera from the corneal lip of the scleral wound. He claims that the sclerectomy provides an exit for blood and prevents accumulation of fluid in the suprachoroidal space; thus preventing postoperative hypertension and permitting freer use of mydriatics.
Ray K. Daily.

Talbot, Graeme. **Histology of Bowman's membrane in cases of glaucoma.** Brit. Jour. Ophth., 1938, v. 22, April, pp. 210-214.

Specimens of 32 eyes were studied. Fourteen presented evidence of glaucoma substantiated by the clinical histories. In all cases small hemispherical bodies about ten microns at their base, with the base applied to the corneal epithelium, were observed. The origin of these bodies is a matter of speculation. (Tables, references.)
D. F. Harbridge.

9
CRYSTALLINE LENS

Andrade, Cesario de. **A case of subconjunctival luxation of the lens.** Tra-

balhos do Primeiro Cong. Brasileiro de Ophth., São Paulo, 1936, v. 1, pp. 137-138.

After a severe blow on the skull, a patient twelve years of age presented subconjunctival luxation of the lens. A vertical scleral rupture 8 mm. long was found slightly in front of the insertion of the internal rectus. The luxated lens was removed through a conjunctival incision, and after an uneventful postoperative course the patient was discharged with fairly good vision.

Ramon Castroviejo.

Derkač, V. **The medical treatment of senile cataract.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 236.

The author discusses the possibilities of local medical treatment of senile cataract on the basis of his experience with seven patients, only two of which persisted in treatment as long as the author thought desirable. After a severe reaction from intraocular injection of vitamin-C solution, the author limited himself to instillations and subconjunctival injections. Both patients improved; one of them enough to be able to read. Why patients react differently to vitamin applied locally and by way of the blood stream is not clear.

F. Herbert Haessler.

Fischer, F. P. **Presence of vitamin B1 in the lens, and its significance.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, Feb., p. 108.

A chemical analysis of beef lens led the author to the following conclusions: (1) Normal lens does not contain thiochrome. (2) The lens contains vitamin B1. (3) Beef lens contains 0.001 Y of vitamin B1. (4) The cataractous lens does not appear to contain vitamin B1. (5)Neither the weight of the lens nor the age of the subject exercises any influence on the pyruvic acid content. General conclusions: (1) Metabolic disturbance of the glucosides plays an important part in the pathogenesis of cataract. (2) It is characterized by insufficient reduction of pyruvic acid into lactic acid. (3) It is due to disappearance of vitamin B1 in cataract.

Derrick Vail.

Fradkin, M. I., Beketovskii, H. P., and Levin, L. S. **Lysozyme in postoperative ocular infections.** Viestnik Opht., 1937, v. 11, pt. 4, p. 496.

The authors used lysozyme, applied on a cotton pledget to the wound, beneficially in ten cases of postoperative cataract infection. They are convinced that they could not have saved the eyeball and some vision with the customary therapeutic procedures. Equally effective was the instillation of lysozyme in infected perforating corneal wounds.

Ray K. Daily.

Gifford, S. R. **Recent views of senile cataract.** Jour. Iowa State Med. Soc., 1937, v. 27, July, p. 279.

Glutathione, which is present in large amount in the normal lens, becomes absent in the cataractous lens. Of equal importance is the more recently discovered cevitamic acid or vitamin C. This is found in large amount in the normal lens. Theoretically, subclinical deficiencies in vitamin B2 or vitamin C, or even of the estrogenic hormone, may, by removing certain protective or antitoxic reserves, disturb lens metabolism sufficiently to cause cataract. But the author insists that this theory is far from being proved.

There is no known nonsurgical cure once a cataract is formed. Vitamins liberally used may possibly prevent or delay progress. Cataract may be operated upon whenever it interferes seri-

ously with vision. Good results may be expected by either the intracapsular or the extracapsular method in the hands of an experienced surgeon.

F. M. Crage.

Komers, Jaroslav. **The Marfan syndrome.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 340-342.

Up to date, hardly ninety cases of the Marfan syndrome have been described in the literature. The origin, according to Weve, must be conceived as a developmental alteration in the mesoderm. The author observed a case having the following symptoms: bilateral ectopia lentis; cardiac systolic murmurs, and dolichocephalus and lumbar lordosis of the vertebral column. All these symptoms form part of the Marfan syndrome. The case differed from this syndrome in the short fat phalanges of the fingers and toes; in the muscles being well developed; in the occurrence of cushions of fat, especially on the lower extremities; and in an increased basal metabolism (114 percent). The patient was a collegian seventeen years of age, otherwise entirely well developed. Neither the eye defect nor the somatic abnormalities could be attributed to ancestry.

Georgiana D. Theobald.

Stevenson, C. P. **Ocular hypertensive complications in cataract operations.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., São Paulo, 1936, v. 1, pp. 139-151.

The author reviews at length the different complications that may produce a rise of intraocular tension after cataract operations. He concludes that prophylactic use of eserin after the operation does not prevent glaucomatous attacks. He prefers the use of a solution of adrenalin, ergotin, and calcium chloride as recommended by Abadie, to prevent the postoperative vasodilatation which gives rise to hypertension. He closes the cataract incision with a special suture passed through the sclera, which he calls the scleral U suture. It penetrates into the anterior chamber and produces drainage, keeping the tension low during healing.

Ramon Castroviejo.

10

RETINA AND VITREOUS

Arkle, J. S. **Thrombosis of central retinal artery following injury to eye.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 353.

A woman 47 years of age fell, striking her eye on a nail protruding from a door. The conjunctiva was lacerated and there was considerable edema and conjunctival hemorrhage, but otherwise no evidence of perforation of the globe. The media were clear, the retina slightly edematous, with a few hemorrhages about the optic disc and very definite fragmentation of the blood stream in the vessels above the disc. A few days later the fundus picture changed to one more typical of embolus of the central artery. Complete optic-nerve atrophy developed. It is concluded that the optic nerve must have been directly injured at the time of the fall, without causing more hematoma and injury to the orbit itself.

Beulah Cushman.

Bartley, S. H. **Some observations on the organization of the retinal response.** Amer. Jour. of Physiology, 1937, v. 120, Sept. 1, p. 184.

Bartley conducted experiments to show that type of retinal organization in which some part of the optic pathway in the retina cannot follow rapidly given flashes, but in which the elements take turns in responding to succeeding

flashes in keeping with the length of their cycles of action and recovery and flash frequency. This alternation accounts for the continued reactivity to steady stimulation and critical flicker frequency. Theodore M. Shapira.

Bride, T. M. **Embolism of the central artery of the retina in a child eight years of age.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 346.

An eight-year-old child developed an embolism of the left central artery of the retina while suffering from chorea. Six months later the eye was convergent and the optic nerve completely atrophic. Beulah Cushman.

Ellett, E. C. **Two cases of quinine amblyopia associated with retinitis pigmentosa,** Jour. Tennessee State Med. Assoc., 1937, v. 30, May, p. 174.

The author considers this association purely accidental and the interest in it only academic. In one case there was no consanguinity of parents; in the other, the parents were third cousins. The nerve heads were white in both cases. In one there were no visible vessels except on the disc; in the other, the arteries were obliterated. The first patient gave a history of having received four injections of quinine of four grains each when eight months old. She was first seen by the author when four years old.

The other patient, nine years of age, had received three or four hundred grains of quinine within a week when two years old. F. M. Crage.

Franta, Jiri. **The albumen in subretinal fluids.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 201-208.

In fourteen cases of retinal detachment (eleven idiopathic in myopes and three traumatic) the refractometric index (with the Pulfrich refractometer) showed 0.770 to 3.345 percent albumens in the subretinal fluid. In twelve cases the retinal detachment was recent (ten days to four months); in two cases it had lasted three years. In recent detachments of short duration the quantity of albumen was proportionately constant; in eight cases in the proportion of 1.079 to 1.594 percent; three cases were below 1 percent and only one was 2.160 percent. In two cases of three years duration, the amount of albumin was very large—3.036 and 3.345 percent; both cases were traumatic in origin. The amount of albumen in recent detachments is such as is found in transudates; in the old cases, the amount is such as is found in exudates. In any case no more albumin was found in the subretinal fluid than in blood serum (that is to say, 7 to 8 percent).

These results affirm the theory of secretion in idiopathic detachment of the retina, according to which the subretinal fluid develops as an inflammatory transudate from the choroidal vessels. The results do not agree with those recently published by Arruga and Magitot according to which the quantity of albumen in the subretinal fluid reaches 10 to 15 percent and is much greater than the quantity in the blood serum. Georgiana D. Theobald.

Fritz, A. **A contribution to the physiopathology of the retinal edemas.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 25.

The author's essential point is that retinal edema can filter from the capillaries at the level of different vessels, to the extent that the blood pressure existing at such a level is sufficient to overcome the resistance of the endothelium. The circulatory obstructions may exist very high in the arteriole as in eclamptic retinitis. The edema is then

essentially of precapillary origin, and the lesions of the retinitis are correspondingly limited. It is in the integrity of the capillaries that we must seek the explanation of the complete cure of eclamptic retinitis. If the circulatory obstructions lie at the level of the venule, the capillaries can no longer escape the resultant elevation of pressure at the beginning of which they alone transude the liquids of the edema, and the papilla is but little involved; but with excessive pressure the venule also takes part in the transudation and the papilla is more involved. J. B. Thomas.

Fuchs, Adalbert. **Importance and etiology of holes in detachment of the retina.** Arch. d'Opht.-Rev. gén. d'Opht., 1938, v. 2, Jan., p. 18.

Only idiopathic and traumatic retinal detachments are considered. Detachment of the retina is not a disease in itself, but a change in position of the retina which may come from different causes. A description of the various kinds of hole encountered is given, and the localization of the tear is discussed. Gonin's contention that most tears occur in the upper outer quadrant is supported by the author. Two principal theories are held regarding the etiology of retinal detachment: (1) the theory of traction by the vitreous body, (2) the theory of cystoid degeneration of the retina. The author believes that most cases of retinal detachment fall in the first group, but that a few of them are due to primary cystoid degeneration of the retina. The author advances the theory that in most cases a congenital fragility of the retina, combined with detachment of the vitreous body and traction by the latter, produces definite retinal detachment. Other cases may be due to the cohesions between the choroid and retina being more feeble than normally. Among other causes of holes or tears in the retina are stretching of the choroid in myopia, retinal cyst, coloboma of the choroid, and finally inflammatory synechia between the retina and the choroid. (Illustrations, bibliography.) Derrick Vail.

Gallenga, Riccardo. **Hemorrhagic thrombophlebitis of the retina in amebic dysentery.** Rassegna Ital. d'Ottal., 1937, v. 6, Nov.-Dec., p. 627.

A man of 24 years suffering from amebic dysentery had recurrent retinal hemorrhage. Tuberculin studies were negative and other causes were excluded. There were 7 percent of eosinophiles in the blood and endamoeba hystolytica was found in the stool. Recovery followed treatment of the intestinal tract. Gallenga reviews 105 cases of ocular complications of amebiasis in the literature, and discusses the pathogenesis. Eugene M. Blake.

Heinsius, Ernst. **Eyeground changes in diabetics.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 207.

Among 221 diabetics, the author found 45 with retinal changes that could be considered typical retinitis diabetica. One hundred and two of the diabetics had had exhaustive general study and 22 of these had retinitis. An analysis of the general findings as related to various details of the ocular manifestations was illuminating. Retinitis occurred most often when the blood-sugar concentration was between 150 and 350 mg. per c.c. Hypoglycemia does not seem to be associated with a high incidence of retinitis. More than one half of the patients with retinitis had normal or low blood pressure, and predominantly diabetic retinitis occurred without coincident hypertonic fundus. Diabetics with hypertension

were frequently observed without retinitis. Retinal hemorrhage in diabetic retinitis rarely occurs in patients under fifty years; while spots with hemorrhage occur chiefly in women under fifty years and with blood pressure under 140 mm.

F. Herbert Haessler.

Kleefeld, G. **Photography of annular opacities of the vitreous.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 116.

The importance of the problems connected with the question of annular opacity of the vitreous is very great. Numerous writers continue to see the origin of retinal detachment in tractions within the vitreous. Others, including the present author, believe that the morbid entity of annular opacities certainly has no connection with detachment of the retina. (6 figures, 2 illustrating the apparatus and 4 the fundus oculi.) J. B. Thomas.

Langdon, H. M. **Treatment of detachment of the retina by use of the thermophore.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 525-529.

Lijo Pavia. **The eyeground. The green spots.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., São Paulo, 1938, v. 1, pp. 157-165.

In some pathologic conditions of the eye the author has found green spots in the fundus. Five cases are reported in which this peculiar coloration was present. The author believes now, as before, that this green color is found in cases of edema of the retina, and is due to biliverdin produced in the tissues by oxidation of the bilirubins of the blood serum. (5 references.)

Ramon Castroviejo.

Margenat, J. **Circinate retinitis.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., São Paulo, 1936, v. 1, pp. 125-127.

The author reports two cases and briefly reviews the pathogenesis.

Ramon Castroviejo.

Patton, A. W. **Embolism of right central artery with retention of some central vision.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 354.

A boy eleven years of age, who had been healthy except for boils six months before, gave a history of sudden loss of the right vision one month previously. The right disc was white with blurred edges, the arteries and veins narrow. A small temporal area of the retina was apparently normal, being supplied by two small vessels which emerged from the edge of the disc.

Beulah Cushman.

Prevec, Slavko. **Several central retinal detachments observed for a long time.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 222.

In four patients the author was able to follow the development of macular hole in the retina from cystoid macula with subsequent central retinal detachment. Two of the patients refused operation. Observation of these patients emphasized the peculiarities in nature and course which differentiate central retinal detachment from peripheral. The hole in the macula may persist as an only lesion. When central detachment occurs, it may remain stationary or even heal spontaneously, a point which is particularly important in view of the difficulty of surgical therapy in this region. The vitreous need not be involved at all. The anatomic relations of the fovea—the relative thickness of the perifoveal retina, and the arrangement of nerve fibers and blood vessels—

are probably the characteristics which determine the difference in behavior of central and peripheral detachments.

F. Herbert Haessler.

Reimova-Frantova, Milada. **Retinal and optic nerve changes in various forms of hypertension.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 208-217.

Careful fundus examination is important to establish a differential diagnosis between benign and malignant scleroses. In cases of hypertension, arteriosclerotic changes occur at foci of degeneration. In cases of marked renal insufficiency, or even where the renal function is still only relatively altered, a retinitis of the angiospastic type was found. Optic-nerve atrophy is found more often in the former cases than in the latter; it advances slowly and is almost always irreparable.

Georgiana D. Theobald.

Rones, Benjamin. **Significance of vascular changes in the retina.** Med. Ann. Dist. of Columbia, 1937, April, v. 6, p. 104.

Cases of advanced arteriosclerosis without hypertension and little evidence of cardiac or renal damage may show retinal arteries of normal caliber, some irregularity in width of the blood column, and considerable tortuosity in the larger vessels. There may be few hemorrhages or exudates. In older arteriosclerotics with hypertension, the larger arteries are constricted all along and are quite straight; and venous compression and scattered hemorrhages and exudates occur.

The essential-hypertension cases may show spasm of a vessel, either transient or prolonged. If the hypertenion persists, permanent local constriction occurs, the light reflex widens, and the smaller vessels become tortuous, especially at the macula. Venous compression is marked, and later a wide variety of hemorrhage and exudates occur. This is the form to which the name "albuminuric retinitis" has been given.

F. M. Crage.

Rosenblum, M. E. **Diascleral extraction of intraocular foreign bodies and prophylaxis against retinal detachment.** Viestnik Opht., 1937, v. 11, pt. 5, p. 630. (See Section 16, Injuries.)

Ruggeri, Rosario. **A special familial syndrome (cortical amblyopia, epilepsy, vestibular disturbances).** Riv. Oto-Neuro-Oft., 1937, v. 14, July-Aug., pp. 393-405.

Two brothers were affected by a congenital syndrome not yet described in the literature, and consisting of a high degree of amblyopia, nystagmus, and sluggish reaction of the pupils to light; accompanied by vestibular disturbances and epilepsy. Encephalography showed evidences of cerebral atrophy.

M. Lombardo.

Streiff, E. B., and Zeltner, C. **The Laurence-Moon-Bardet-Biedl syndrome.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, April, p. 289.

A patient affected with the complete Laurence-Moon-Bardet-Biedl syndrome is described. Adiposo-genital dystrophy, polydactylia, peripheral tapeto-retinal degeneration of the retinitis-pigmentosa type and mental retardation were present. The patient's parents were first cousins; three brothers, one of whom was affected with polydactylia, died at an early age; and one sister was living and in good health. An exhaustive description of the cases in the literature and a review of the entire subject are offered. An analy-

sis of all the published cases shows that only retinitis pigmentosa, polydactylia or syndactylia, and adiposo-genital dystrophy can be considered as cardinal symptoms. Nothing is known of the pathogenesis. In 24 percent of the cases there was some consanguinity in the parents. (Illustrations, charts, complete bibliography.) Derrick Vail.

Weekers, L. **The importance of perforations of the ocular shell in the operative technique of retinal detachment.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 49; and Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, March, p. 193.

Experimental puncture of the rabbit eye and histologic examination at varying intervals revealed that the proliferating episcleral tissue became entangled in the opening and intimately adhered to the retina. The episcleral proliferation, which is remarkably active, occurs not only at the surface of the sclerotic but in its deeper layers. It was this especially which maintained adhesion of the retina to the point of perforation. To obtain the best possible scleral reaction it is only necessary to perforate the ocular shell with a fine-pointed cataract knife or a very fine needle. Hemorrhages can be avoided by passing a weak diathermic current through the knife or needle after perforation. As is well known, this use of diathermy increases the choroidal reaction in variable degree depending on the kind, intensity, and duration of the current. The adhesive choroiditis obtained by a scleral surface coagulation is less resistant and more subject to relapse. Eight human eyes were perforated some days before enucleation for various reasons (absolute glaucoma, tumor, and so on). Histologic examination of these enucleated eyes revealed the same process as in the experimental animals. (4 illustrations, charts, bibliography.) J. B. Thomas. Derrick Vail.

11
OPTIC NERVE AND TOXIC AMBLYOPIAS

Dosher, W. S. **Report of a case of Paget's disease of bone, with an associated optic atrophy and a brief review of the literature.** Southern Med. Jour., 1937, v. 30, Oct., p. 985.

After a description of Paget's disease, the author reports a case associated with optic atrophy and marked restriction of visual fields. It is believed that these eye complications are due to stenosis of the optic foramina and that the stenosis is a part of the picture of Paget's disease of bone.

Ralph W. Danielson.

Knobloch, R. **Experiment concerning the effect of artificial hypotonus on atrophy of the optic nerve.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 326-329.

The author describes his experiment concerning the effect of artificial hypotonus upon atrophy of the optic nerve following quinine intoxication. Rabbits are used for the work, and, because optic atrophy cannot be recognized with the ophthalmoscope, all the eyeballs must be sectioned. Up to now he has reached no conclusion.

Georgiana D. Theobald.

Moore, D. F. **Nutritional retrobulbar neuritis followed by partial optic atrophy.** The Lancet, 1937, v. 1, May 22, p. 1225.

In 1934 the same author published a report, which included a summary of earlier findings, on retrobulbar neuritis followed by partial atrophy due to avi-

taminosis. The symptoms were shown to be defective vision associated with active symptoms or a past history of a sore tongue and sore mouth, a scaly, itching scrotum, and mental and other manifestations. These patients and this condition are reported from Nigeria. Loss of vision may be very profound. After the first onset of symptoms there is a definite pallor of the disc which may become quite marked. The author and other investigators have been able to show that this is due to a vitamin B deficiency and can be cured by administration of Marmite or with yeast. (2 case reports, 20 references, 2 figures.)

Ralph W. Danielson.

Raverdino, E. **Idiosyncrasy to quinine and malaria therapy of tabetic affections.** Riv. Oto-Neuro-Oft., 1937, v. 14, Nov.-Dec., pp. 537-544.

A tabetic man of 45 years was submitted to malaria therapy from which he had nine febrile accesses of 39.3 to 43.3 C. No disturbance of the visual apparatus occurred. The patient then received hypodermically one gram of quinine hydrochloride daily for six days. Visual disturbances followed, including reduction of vision to R. 2/10 and L. 4/10, with marked concentric contraction of the fields for form and colors. The discs showed temporal pallor and the blood vessels were moderately contracted. The quinine treatment was discontinued and the eye condition returned to normal in about three months. (Bibliography.)

M. Lombardo.

12

VISUAL TRACTS AND CENTERS

Bartley, S. H., O'Leary, J., and Bishop, G. H. **Differentiation by strychnine of the visual from the integrating mechanisms of optic cortex in the rabbit.** Amer. Jour. of Physiology, 1937, v. 120, Nov. 1, p. 604. (See Amer. Jour. Ophth., 1938, v. 21, April, p. 481.)

Nielsen, J. M. **Unilateral cerebral dominance as related to mind blindness.** Arch. Neurol. and Psychiat., 1937, v. 38, July, p. 108.

The term mind blindness and the various agnosias embraced by this term are mentioned. Abstracts of cases of mind blindness considered genuine are presented and discussed. They include principally injury, compression, and disease affecting the occipital lobe. Some conclusions are: One occipital lobe is dominant over the other for recognition of objects. The dominant lobe is usually the left but may be the right, even in right-handed persons. Within the occipital lobe the cortex of the second and third convolutions represents an area essential for recognition of objects.

F. M. Crage.

Ottonello, Paolo. **Synchronous myoclonias in territories supplied by cranial nerves.** Riv. Oto-Neuro-Oft., 1937, v. 14, July-Aug., pp. 343-355.

A man of 24 years had epidemic encephalitis at the age of six years. For the last three years he has been suffering with a syndrome whose elements are to be considered as an expression of a multiple sclerotic process. He shows among others the following eye symptoms: eye excursions normal as to amplitude, but as soon as the globes move nystagmiform movements appear, the direction of which is horizontal if the globes move laterally, vertical in looking upward, and oblique in intermediate directions. The movements to the right are accompanied by synchronous contractions of the right levator alae nasi, which in frequency and amplitude exactly follow the eye movements. In discussing the pathogenesis, the writer

excludes as to sole cause a dysfunction of the regulator of supranuclear structures of the brain, which dysfunction is generally regarded as a cause of synchronous myoclonias. He assumes as another factor a nuclear disorder due to old encephalopathy. (Bibliography.)
M. Lombardo.

Rubino, A. **A contribution to the study of optico-chiasmal arachnoiditis.** Riv. Oto-Neuro-Oft., 1937, v. 14, Nov.-Dec., pp. 552-594.

Five patients (four of them females), aged from 32 to 47 years, were affected by this form of arachnoiditis. The general symptomatology included binocular changes of vision, and visual field changes, with ophthalmoscopic findings. The medical and surgical treatments are discussed. (Bibliography, 18 figures.) M. Lombardo.

Van Duyse. **Concerning a case of chiasmal and hypophyseal syndrome (myxochondroma resulting from metaplasia of a cranio-pharyngioma).** Bull. de la Soc. Belge d'Opht., 1937, no. 75, p. 70.

This very complete case report by Van Duyse carries three illustrations, one of which shows the visual field defect of the right eye. The existence of a chiasmal syndrome (primary optic atrophy, total abolition of the left visual field, and temporal hemianopsia of the right visual field), associated with a syndrome of hypophyseal insufficiency (infantile uterus, amenorrhea), suggested a diagnosis of tumor of the hypophysis or its vicinity. The patient died a few hours after operation and autopsy revealed a tumor composed of a gelatinous mass containing a quantity of small hard spherules. The tumor was adherent to the base of the skull and no trace of sella or hypophysis remained. J. B. Thomas.

Waller, W. H., and Barris, R. W. **Pupillary inequality in the cat following experimental lesions of the occipital cortex.** Amer. Jour. of Physiology, 1937, v. 120, Sept. 1, p. 144.

The authors used six cats to prove that unilateral removal of the cortical pupillo-constrictor area at the lower end of the posterior lateral gyrus resulted in inequality of the pupils; the pupil on the side opposite the lesion usually being wider. They also showed that the pupil on the contralateral side was more responsive to light and to painful stimuli than the homolateral pupil. The size of the pupil is probably influenced by the occipital cortex through the cortico-pretectal tract.
Theodore M. Shapira.

13
EYEBALL AND ORBIT

Cérise, L., and Offret, G. **Late development of an orbital graft.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, Feb., p. 132.

In 1934 the right eye of a patient aged twelve years, suffering from congenital buphthalmos, was removed. A sphere from the Achilles tendon of a calf was implanted. Seventeen months later the graft had completely disappeared, giving place to a large pseudocystic pocket. This was not due to inflammation or infection, but to slow development of a cystic swelling beneath the conjunctiva which covered the graft. (Illustration, bibliography.)
Derrick Vail.

Duc. Camillo. **Orbital localization in Kahler-Bozzolo disease and in acute myeloid leukemia.** Rassegna Ital. d'Ottal., 1937, v. 6, Nov.-Dec., p. 719.

A 46-year-old woman presented a large tumefaction in the left supra-orbital region. Histologic examination showed multiple myelomata, confirmed by X ray and the presence of Bence-Jones proteinuria. There was a moderate anemia of the hypochromic style. Death from disseminated myelomata resulted in six years. A two-year-old girl suffered from acute myeloid leukemia, with cutaneous lesions and absence of hemorrhages. Toward the end of the disease a tumor formation appeared in the right upper lid. The author calls attention to the rarity of the findings. He could discover none similar in the literature. He calls attention to the analogy between the two diseases in which these palpebro-orbital tumefactions occurred. (9 figures.)

Eugene M. Blake.

Joiris, P., and Bonhomme, F. **Death following enucleation.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 105.

The patient, eight years old, died of meningitis fifteen days after enucleation of an injured eye. (5 references.)

Kessler, R. **Panophthalmitis following pneumonia.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 329-332.

At the Czech eye clinic in Prague, two cases of panophthalmitis following pneumonia were observed. One appeared on the fourth day after pneumonia developed, the second appeared three weeks afterward. On their arrival at the clinic the two patients were already without fever. After a month of treatment they left the clinic with signs of beginning atrophy of the globe.

Georgiana D. Theobald.

Langhammerova, R. **Gummatous periostitis of the orbit.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 228-233.

A case report of gummatous periostitis involving the frontal bone in a 62-year-old woman, with secondary involvement of the periosteum. Specific therapy (bismuth, iodides, neosalvarsan) promptly used resulted in complete healing in about three weeks.

Georgiana D. Theobald.

Purtscher, Ernst. **The etiology of "spontaneous" choroidal detachment and "serous tenonitis."** Zeit. f. Augenh., 1938, v. 94, Jan., p. 12, and Feb., p. 141.

A man of 67 years suddenly became ill with migraine-like pains on the left side of his head and signs of serous tenonitis in the left eye. On arrival at the clinic, only an extensive choroidal detachment on the left eye was manifest. While this detachment was regressing, manifestations of serous tenonitis on the right side of the head developed. After this, a right choroidal detachment occurred and rapidly became extensive. In three days more, retinal detachment and hypotony developed. For two weeks the eye remained in this condition, then the choroidal detachment disappeared quickly while the retinal detachment increased. After a little more than one month, the tension became normal and the retinal detachment disappeared. There was no reason for believing that the tenonitis was caused by an intraocular affection of which the choroidal detachment might have been an expression. Observations have been published to show that choroidal detachment may be an expression of collateral edema secondary to an inflammatory process about the eyeball or even in the sclera. In Purtscher's patient, it seems most probable that the cause of the tenonitis must have resided in the "inner limiting membrane" of Tenon's space, namely, the sclera. The author

quotes descriptions of related clinical syndromes published by Fuchs and Wagenmann; and he suggests that the posterior scleritis to which both the serous tenonitis and the choroidal detachment were secondary resulted from a vasomotor neurosis on an allergic basis. F. Herbert Haessler.

Schreyling, Hans. **Spontaneous orbital hemorrhage during menstruation.** Klin. M. f. Augenh., 1938, v. 100, March, p. 357.

In a woman of 38 years a sudden spontaneous orbital hemorrhage, manifested by ecchymosis of the lids and exophthalmos without inflammation, occurred synchronously with the onset of menstruation. In two weeks the blood had been absorbed. Only five similar experiences have been recorded in the literature on vicarious menstruation. F. Herbert Haessler.

Schutzbach, M. **Extreme malformation of the skull.** Zeit. f. Augenh., 1938, v. 94, Feb., p. 131.

The author describes an infant with dysostosis cranifacialis and dislocation of both globes anterior to the extremely small orbits. The malformations, however, were not identical with those described by Cronza in 1912. There is some similarity to oxycephaly, but the condition differs from the latter in that it was present at birth. Various congenital anomalies were found in several siblings as well as in members of two ascendant generations.

F. Herbert Haessler.

Sverdlov, D. G. **Individual ocular prothesis for abnormal conjunctival sacs.** Viestnik Opht., 1937, v. 11, pt. 4, p. 570.

This is a second article on the subject. The prothesis, molded from dental compound and painted with cornea and iris, is used by the factory as a model for the making of an artificial eye.

Ray K. Daily.

14
EYELIDS AND LACRIMAL APPARATUS

Appelbaum, Alfred. **Chancre of the upper eyelid in an infant two months of age.** Arch. of Ophth., 1937, v. 18, Dec., pp. 920-925.

The author reviews the literature and reports the case of a boy who presented a swelling of the right upper lid two months after birth. Dark-field examination of secretion revealed spirochetes. The lesion healed entirely after administration of mapharsen and bismuth subsalicylate. The source of infection was presumably a secondary lesion present in the mother's birth canal at the time of delivery. (Photograph.)

J. Hewitt Judd.

Arruga, H. **Surgical treatment of lacrimation.** Arch. of Ophth., 1938, v. 19, Jan., pp. 9-21.

In cases of simple lacrimation, it is advisable to attempt prudent exploration by irrigation and probing. In the great majority of cases other procedures are necessary. Stricturotomy and extirpation of the lacrimal gland are not advised. But in the large majority of cases dacryostomy (dacryocystorhinostomy) is the method of choice. The author makes a bony opening with a trephine 1.5 cm. in diameter. The opening is enlarged by beveling the bony opening on the nasal side, giving it a conical form and allowing the mucosa to approach the sac at an obtuse instead of a right angle. The sac and mucous membrane are then incised and the margins united by two to four sutures on each side. With slight varia-

tions it is possible to establish lacrimal drainage by this method in cases of absence of the sac. J. Hewitt Judd.

Avgushevich, P. L. **A comparison of immediate and late results in the Panas, Snellen, and Mellinger-Sapeshko operations.** Viestnik Opht., 1937, v. 11, pt. 4, p. 557.

On the basis of a large material and observations extending over nine years the author concludes that the Panas operation is effective for trichiasis and entropion, but has the disadvantage of frequent cosmetic defects and necrosis. The best results of the Mellinger-Sapeshko operation are in trichiasis. The cosmetic results are good, but the implant frequently fails to take, particularly in lids which have been operated on previously. Snellen's operation is less effective than the other two, but it has the merit of complete freedom from cosmetic defects.

Ray K. Daily.

Baltin, M. M., and Serebrianni, Z. M. **Treatment of skin carcinoma with border ("Grenz") rays.** Viestnik Opht., 1937, v. 11, pt. 5, p. 677.

A tabulated report of fifteen cases of lid carcinoma, treated with border ("Grenz") rays and followed two to sixteen months. The conclusions are that the treatment with fractional doses and a large total dose gives a rapid satisfactory result. The treatment lasts fifteen to twenty days and the growth disappears in five to seven weeks. Massive dosage prolongs the treatment period. A good result was obtained in two cases which had failed to respond to radium. The treatment lends itself to accurate dosage, is harmless to the eye, simple, and cheap. (Illustrations.)

Ray K. Daily.

Böck, J., and Schlagenhauff, K. **The occurrence of oncocytes in the human lacrimal gland.** Zeit. f. Augenh., 1938, v. 94, March, p. 244.

Oncocytes are enormous cells with pale rather foamy cytoplasm which contain very small acidophylic granules. They are found at times in mucous, serous, and endocrine glands, more commonly after middle age. After fifty, they are regularly found in the sublingual gland. Presumably, they develop in the basal layer of cells and push their way through to the lumen. They may occur in clumps. These cells are not mentioned in the section on the tear gland in Möllendorf's handbook of histology nor in recent essays on the histopathology of the lacrimal gland. The author found oncocytes in seven of the lacrimal glands taken at autopsy from twenty subjects over fifty years of age. F. Herbert Haessler.

Charamis, J. S. **Dermomuscular pedicles in plastic surgery of the lids.** Arch. d'Opht.-Rev. gén. d'Opht., 1938, v. 2, March, p. 206.

In twelve cases of various lid deformities, mostly cicatricial, the author practiced pedicle flaps consisting of skin and a thin layer of the underlying muscle. The results were uniformly good. In all cases palpebral folds were formed spontaneously and regularly and only rarely did the prominence found during the first month persist. The motility of the lids was perfect from all points of view. (Illustrations, references.)

Derrick Vail.

Debroeu, G., and Hermans, R. **Blepharitis caused by congenital anomaly of the lacrimal passages.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 109.

A case report with six references.

Fischer, Franz. **Anomalies of the lacrimal passages and their structural genesis.** Zeit. f. Augenh., 1938, v. 94, Jan., p. 1, and Feb., p. 152.

Textbook explanations of this subject are for the most part based on older embryologic knowledge. The extensive work of Speciale Cirincione is usually ignored. Fischer has, therefore, collected from the literature all descriptions of lacrimal-passage malformations, and he interprets the findings systematically with due consideration of the newer knowledge of the development of these structures. The anomalies of the canaliculi include: (a) Membranous atresia of the canaliculi: A normal canaliculus has origin in a normal punctum but is occluded by a superficial membrane or by a plug of cells near its origin. A sound can easily be passed and soon reaches a normal canaliculus. (b) Absence of lacrimal puncta and canaliculi: No punctum can be found, and on cutting through the skin one finds no canal at all or only a rudimentary strand of epithelial tissue. Attempts to incise the region of the caruncle and to introduce a permanent sound in the hope that it will become surrounded by epithelium have been fruitless. (c) Atresia of punctum and canaliculus: This anomaly has been reported only twice, and is easily explained by reference to the fact that canaliculi begin as solid structures in the embryo and subsequently become canalized. (d) Reduplication of a canaliculus has been reported. It must be distinguished from double punctum with single canaliculus. (e) Three puncta with one canaliculus have been reported, and also triple canaliculus. (f) Quadruple lower punctum has been reported once. Development of multiple puncta was formerly explained as abnormal budding from the epithelial mass which had separated from the superficial ectoderm. It is now known that the canaliculi begin by proliferation of the superficial ectoderm into the deeper tissues. (g) In trough-like canaliculus the ductlet appears as though slit. The groove develops by destruction of cells in a manner analogous to formation of the punctum.

Anomalies observed in the tear sac are: absence of the sac, reduplication, diverticulum, and congenital fistula. The common anomaly in the region of the naso-lacrimal duct is atresia of its lower end, from failure of the stratum of epithelium which separates the naso-lacrimal duct from the lateral nasal diverticulum to disappear at the end of the fetal period. F. Herbert Haessler.

Gozberk, Rifat. **A case of staphylococcus septicemia following a meibomian abscess.** Ann. d'Ocul., 1938, v. 175, Feb., pp. 159-165.

An eleven-year-old boy, convalescing from measles, developed a meibomian abscess from which staphylococcus aureus was recovered. Staphylococcus septicemia ensued with abscesses in both orbits, the brain, lungs, and kidneys. Incision and drainage of the original abscess, autovaccine therapy, and craniotomy for temporal lobe abscess were used. Autopsy confirmed the diagnosis but failed to show evidence of sinus thrombophlebitis.

John M. McLean.

Guillot, L. **An epiphora, precursor of tumor.** Bull. Soc. Belge d'Opht. 1937, no. 75, p. 11.

The patient complained of epiphora of the left eye four years before the symptomatology pointed clearly to intracranial origin. The lacrimal passages were easily permeable by irrigation.

Eventually, most of the cranial nerves were involved, including the optic, the auditory, and fibers of the fifth. The patient died during a respiratory crisis. Radiogram and symptoms pointed to a basal tumor, involving the cerebellopontine angle. J. B. Thomas.

Hagedoorn, A. **Cysts of the margin of the eyelid.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 487-491.

Hynie, Jiri. **Lyritzas' operation for cicatricial entropion.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 314-318.

Since 1933, when Lyritzas published his new method for removing operatively cicatricial entropion of the upper eyelid (see Amer. Jour. Ophth., 1935, v. 18, p. 292), the author has performed 26 operations of this kind at the Bratislava eye clinic; for the most part in very advanced cases of trachomatous origin. The operation is relatively simple and rapid; the results are very satisfactory for function and cosmetic effect, as well as for permanence.

Georgiana D. Theobald.

Kleefeld, G. **Median, non-mutilating blepharorrhaphy.** Bull. Soc. Belge d'Opht., 1937, no. 74, p. 16.

The author describes and illustrates an operation which, because of the total absence of mutilation of the lids and the certainty of tolerance of the tarsorrhaphy, convinces him that the method should replace the classic median blepharorrhaphy.

J. B. Thomas.

Leonardi, M. **Lid autoplasty.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 20-23.

Excellent results were had in forty cases of blepharoplasty using skin grafts obtained from the posterior surface of the ear. The postoperative care includes absolute rest in bed for six days. The lids are severed only after three months. The method applies well to third-degree ectropion caused by cicatricial changes in the neighboring tissues, where sliding or pedicle grafts are impossible. Clarence W. Rainey.

Leplat, Georges. **The development of the lacrimal passages, and their so-called valves.** Bull. Soc. Franç. d'Opht., 1937, v. 50, p. 9.

Reviewing the works of other anatomists who describe the folds and valves found in the lacrimal passages, the author explains the diverse findings by developmental peculiarities of the various tissues, easily seen and studied in the embryo. Clarence W. Rainey.

Rubbrecht, R. **Simplified technique for the Toti operation.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 14-20.

The author blocks the nasal and infraorbital nerves with 4-percent novocaine, and infiltrates the skin over the lacrimal sac, to reduce hemorrhage. A cotton pledget saturated with cocaine-adrenalin solution is placed under the anterior end of the middle turbinate bone. The incision begins 2 mm. from the internal palpebral ligament, and 3 or 4 mm. from the internal canthus. The incision is carried down to the bone for a length of 2 cm., following the lacrimal crest. The periosteum that covers the lacrimal fossa is detached in such a fashion as to contain the lacrimal sac, and for a distance of 2 or 3 mm. inward from the anterior lacrimal crest. The author uses a Kerrison forceps to resect the lacrimal bone in the region bounded by the lacrimal crests, extending from the level of the internal canthus to the opening of the lacrimal canal. When the nasal mucosa thus ex-

posed is found to be diseased, it is excised, and the operation is finished according to the method of Toti. Otherwise the mucosa is incised in an arcuate manner, so as to form a flap hinged posteriorly. The posterior wall of the sac is resected almost entirely, conserving a width of 2 mm. of the posterior border. The free border of the nasal flap is approximated to the remains of the wall of the sac, correct apposition being obtained with three catgut sutures. No special after-care is necessary. Clarence W. Rainey.

Spackman, E. W. **X-ray studies of the nasolacrimal duct.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 518-524.

Sugita, Y., and Sugita, S. **Differences in the histochemical reaction of different parts of the eyelid.** Graefe's Arch., 1938, v. 138, pt. 4, p. 404.

The protoplasm of the epidermal cells of the skin of the eyelid and that of the epithelial cells of the conjunctiva react as neutral to weakly acid, while the fibers of the corium and of the tarsus react as alkaline. This fact is manifest through metachromasia from staining with methylene blue or pyronin.

H. D. Lamb.

Talkovski, S., and Machlin, I. **Hypertrichosis of the eyelashes.** Viestnik Opht., 1937, v. 11, pt. 5, p. 689.

A report of a case in a young woman with unilateral hypertrophy of the eyelashes, in conjunction with tuberculous kerato-irido-scleritis. After a review of the scanty literature on the subject the author takes a view opposed to Schopper and Behr, attributing this disturbance to a deficiency of sympathetic function resulting in an increased vascular supply to the involved area.

Ray K. Daily.

15

TUMORS

Bloch, F. J., and Grove, B. A. **Tuberous sclerosis with retinal tumor.** Arch. of Ophth., 1938, v. 19, Jan., pp. 34-38.

A case of tuberous sclerosis of the brain with retinal tumor is reported. This condition is a heredofamilial disease associated with mental deficiency, manifested by cerebral symptoms varying in degree from "absences" to petit mal and grand mal. Other manifestations are Pringle's nodules of the face or other fibromas of the skin distributed elsewhere on the body, principally the neck, and fibromas of the heart, kidneys, spleen, lungs, and brain, as well as tumors of the retina or the disc. The retinal tumors arise from the nerve-fiber layer, protrude into the vitreous, and have the appearance of a white mulberry or tapioca-like nodules. There are many incomplete forms, and it is likely that the disease is not very rare but frequently fails of recognition.

J. Hewitt Judd.

Claes, Elsa. **Primary glioma of the optic nerve.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 97.

Primary tumors of the optic nerve are rare. Three hundred cases were found in the entire literature, two hundred of them gliomas. These latter resemble glioma of the central nervous system in their slow development in contrast with the fulminating evolution of the gliomas of the retina. They appear generally during the first ten years of childhood, seldom as late as in the case reported by the author, which was at 34 years. A careful report of the histopathology of the tumor is included in this paper. (3 figures, 7 references.)

J. B. Thomas.

Coppez, L., and Zanen, J. **A case of glioma of the retina.** Bull. Soc. Belge d'Opht., 1937, no. 74, p. 96.

The patient was a girl aged six years. The globe was removed during the second stage of the growth, which was classified as a neuro-epithelioma of the endophyte type. The presence of stephanocytes and the absence of proliferation of the tumor in the optic nerve preclude the likelihood of orbital recurrence. One should not forget that 20 percent of these tumors are bilateral. (7 photographs.) J. B. Thomas.

De Walsche. **Two cases of bilateral ocular tumors (glioma and metastatic carcinoma).** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 111.

The author notes that his reported cases correspond to the classic descriptions and lack the interest of novelty, but presents them on account of their rarity and certain reflections which they suggest. J. B. Thomas.

Di Marzio, Quirino. **Tumors of the orbit: cylindroma of the lacrimal gland.** Riv. Oto-Neuro-Oft., 1937, v. 14, Jan.-Feb., pp. 65-108.

The writer reports the clinical histories, operative procedures, and histologic findings in eight cases of cylindroma of the lacrimal gland. The patients' ages varied from 17 to 61 years. One of the eight cases was reoperated upon after twenty years and died of endocranial metastasis three years after the second operation. Another patient was submitted to roentgen therapy after the third relapse, with no further relapse. The writer discusses the various hypotheses on the origin and pathogenesis of these tumors, and concludes that their origin varies, some showing an endothelial and others an epithelial character, according to the different embryonic elements which compose the lacrimal gland. The writer advises early total removal of the tumor, with the entire gland; and consecutive roentgen therapy to avoid relapse. (Bibliography, 41 figures, one colored plate.) M. Lombardo.

Fagard, J., and De Walsche, L. **Mixed intraocular tumor, melanosarcoglioma).** Bull. Soc. Belge d'Opht., 1937, no. 74, p. 104.

The age of the patient, 58 years, is exceptional for the development of a glioma, the evolution of which was relatively slow and the enucleation followed by recovery. Intraocular mixed tumors are extremely rare, as is also the association of a tumor derived from the epiblast (glioma) with a melanosarcoma. (2 photomicrographs, 9 references.) J. B. Thomas.

Hine, Montague. **Spontaneous cure of retinal glioma.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 173.

The author reports three eyes from one family in which a definitely malignant growth became spontaneously cured. The father, aged 42 years, had had one eye removed at two years of age, the Royal Eye Hospital records showing excision of the eye for retinal glioma. In his remaining eye there was a patch of retinal and choroidal atrophy which was slightly raised in the center and appeared cystic, salmon-pink to bluish-gray, and no chalky bodies were present. The man's family had consisted of five sons, the first premature and dying at six months. The second was aged nineteen years and had had spontaneous cure of bilateral glioma retinae (colored illustrations). The third had had both eyes removed for glioma, but had died at the age of 21

months from orbital extension. The fourth had had one eye removed for glioma at the age of three months, and the other eye remained healthy at eleven years. The fifth had had one eye excised for glioma at the age of two months, and the second eye treated with radon seeds twelve months later, but he had died from orbital extension at the age of three and a half years. Hine feels that the choroidal lesions as described were healed glioma. (3 colored illustrations.)

Beulah Cushman.

Keyes, J. E. L., and Moore, P. G. **Adenomatous hyperplasia of the epithelium of the ciliary body.** Arch. of Ophth., 1938, v. 19, Jan., pp. 39-46.

In a woman aged 29 years a mass of brown pigment could be seen through the pupil between the iris and the cataractous lens. After enucleation it was found to a be a nodular hyperplasia of the epithelium of the ciliary body. The nodule had replaced the corona ciliaris and the posterior third of the iris. The periphery and the anterior portion of the nodule were heavily pigmented, while the central portions were relatively free from pigment. Two years after enucleation, the remaining eye was normal and the patient healthy. The histologic findings are shown by photomicrographs. J. Hewitt Judd.

Meyer, W. L. **Results of treatment of lid cancer with thorium-X rods.** Klin. M. f. Augenh., 1938, v. 100, March, p. 321.

Of twenty patients with a characteristic mass in the lid, the diagnosis of cancer was made certain by biopsy in six, and in the others there was little room for doubt as to the correct diagnosis. Eighteen were sealed without recurrence. One of the other two died three years later of cancer of the orbit.

Thorium X is delivered in gold capillary tubes 1 cm. long whose wall is usually 0.1 mm. thick but is obtainable in 0.2 and 0.3 mm. thickness. Such needles are thrust into the tumor. One estimates the volume of the lesion and applies approximately 0.5 millicurie per c.c. of tissue. The effectiveness of the tube is reduced to one half in three days and to zero in seven. The manufacturer allows for the time in transit and overloads the tubes so that they will reach the physician at 100 percent strength. F. Herbert Haessler.

Purtscher, E., and Wendlberger, J. **A nevus folicle in the upper eyelid in Bourneville-Pringle's disease.** Graefe's Arch., 1938, v. 138, pt. 4, p. 388.

Bourneville's disease, showing clinically idiocy and epilepsy, is due anatomically to many, usually small, tumor formations lying throughout the central nervous system. These growths are composed essentially of glial proliferation. The skin changes in Pringle's disease are present on the face, usually at or near the nasolabial folds, and consist of small nodules of oval or hemispheric form, and of yellowish-brown to brownish-red color ("adenoma sebaceum Pringle"). These are composed of proliferations of fibrous tissue, beside various nevus-like malformations. A nine-year-old feeble-minded girl presented in the middle of the right upper eyelid a soft tumor, the size of the thumbnail and of brownish-red color. There were other skin changes, resembling those of "nevus multiplex Pringle." Typical nervous and psychic changes, signs of nodular sclerosis of the brain, were not wanting. The excised growth from the upper eyelid showed in sections coarse-

fibered connective tissue of the cutis enclosing superficially cysts derived from hair follicles and deeper-lying hair rudiments. H. D. Lamb.

Sédan, Jean. **Considerable increase in size of a congenital subconjunctival dermolipoma.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 25-31.

A 38-year-old female had a small yellow subconjunctival tumor between the lids at each external canthus, with fullness of the upper lids. Because of a positive Wassermann, and an accompanying iritis, the condition was taken for syphilitic dacryoadenitis until the right eye became worse. An extensive edema occurred temporally. The masses became yellow and lardaceous, and appeared like a solid chemosis, partly covering the cornea. The globe became pushed aside, causing convergence, and there was pseudoptosis. Operative removal of a large tumor mass was done. It was found to be a lipoma or lipodermoid. It did not recur.

Clarence W. Rainey.

Theobald, G. D. **Neurogenic origin of choroidal sarcoma.** Arch. of Ophth., 1937, v. 18, Dec., pp. 971-997; also Trans. Amer. Ophth. Soc., 1937, v. 35, p. 303.

The nature of neurogenic neoplasms in general is discussed, with particular reference to Masson's histologic investigations regarding cutaneous nevi and tumors of the peripheral nerves. The literature regarding melanotic neoplasms and the origin of pigment is reviewed. The neurologic structure of the choroid and of neural tumors of the choroid, including those termed sarcoma, is described. Original observations by the author in seven cases of so-called sarcoma of the choroid are given in detail, and from the histologic observations it is submitted that these tumors originated from the Schwann-sheath cells of the posterior ciliary nerves in their passage through the choroid. A revised classification of neoplasms is suggested, which would distinguish ectodermal neural tumors from those of other embryonic origin. (Photomicrographs.) J. Hewitt Judd.

Tille, H., and Pillet, P. **A clinical and histological note on eighty cases of tumor of the ocular conjunctiva.** Bull. Soc. Franç. d'Opht., 1937, pp. 32-60.

The authors studied the microscopic sections from operative specimens in various ways, to determine the anatomic diagnosis and the clinical prognosis. The incidence of the various types was: nevocarcinoma, 15 percent; epithelioma, 8 percent; papilloma, 7 percent; cancerous papilloma, 2 percent; nevus, 10 percent; epithelial cyst, 8 percent; dermoid cyst, 7 percent; lipoma, 3 percent; fibroma, 15 percent; lymphoma, 15 percent; osteoma, 1 percent. As to recurrence and fatal outcome, the prognosis was bad in nevocarcinoma and epithelioma, but the others were benign.

Clarence W. Rainey.

Tooke, F. T. **A melanoma of the iris with pathological findings.** Brit. Jour. Ophth., 1938, v. 22, March, pp. 153-165.

This contribution is based on studies of a case brought to the attention of the author in 1936. The patient was a young man completing his final year as student of medicine. Studies and procedures are explained. Six months after operation the patient had a perfectly functioning eye. The contribution deals with the genesis of hyperplasia of pigment cells, their origin and character, and the part they play, rather than clinical history and postoperative

behavior. The author supports Masson's theory that melanoblasts in the stroma of the iris are at least sometimes epidermal in origin. (Figures, references.) D. F. Harbridge.

Ziporkes, Joseph. **A case of mixed tumor of the lacrimal gland.** Arch. of Ophth., 1937, v. 18, Dec., pp. 933-937.

Cases reported in the literature are briefly summarized and the findings in the case of a woman aged forty years are reported in detail. After removal of an encapsulated tumor by the Krönlein method, the folds of the retina and the choroidal detachment disappeared in about eight weeks. Histologically the tumor presented normal lacrimal-gland tissue and lacrimal-duct structures at the margin of the tumor outside of the capsule. There were areas of myxomatous tissue and mucoid spindle-cell tissue, areas of pavement epithelium with cystic spaces, occasional mitotic figures, epithelial cells with fine intercellular bridges, and scattered stellate cells, which may have been precartilaginous cells. (Photomicrographs.)

J. Hewitt Judd.

16
INJURIES

Ackerman, R. L. **A case of luxation of the eyeball with complete functional restoration.** Viestnik Opht., 1937, v. 11, pt. 4, p. 581.

A report of a traumatic dislocation of the eyeball, which was replaced after canthotomy. The vision returned to normal in four days, and in two weeks the eyeball recovered except for some cicatrization at the attachment of the external rectus. (Review of the literature.) Ray K. Daily.

Belloni, G. B. **A traumatic lesion of the intracanalicular portion of the optic nerve without fracture of the canal.** Riv. Oto-Neuro-Oft., 1937, v. 14, Nov.-Dec., pp. 521-536.

A man of 29 years, soon after a severe contusion of the right temporal region sustained in an automobile accident, lost the vision of the corresponding eye, which showed also a slight degree of exophthalmos and external strabismus. These symptoms were followed by psychic disturbances. Seven days later the patient died after symptoms of purulent meningitis. The post-mortem examination showed a fracture of the right parietal bone, reaching through the temporal bone into the middle cranial fossa. No fracture of the optic canal was visible, but here the optic nerve showed a triangular section (with base toward the periphery) of disintegrated elements, and signs of beginning abscess. The article closes with discussion on the mechanism of destruction of the nerve elements without lesion of the bony wall. (Bibliography, and 7 figures.) M. Lombardo.

Bride, T. M. **Foreign body on the optic nerve.** Trans. Ophth. Soc. United Kingdom. 1937, v. 57, pt. 1, p. 355.

A small piece of metal was seen lying on the inner half of the optic disc and was removed with a giant magnet through a peripheral iridectomy. Convalescence was smooth and normal vision was retained. Beulah Cushman.

Canon, Gisela. **Gas bacillus infection of the human eye.** Klin. M. f. Augenh., 1938, v. 100, March, p. 394.

Ocular infections with gas bacillus in six patients are described. The clinical manifestations are sufficiently characteristic to make possible a certain diagnosis. Because of the great pathogenicity, it is important to recognize the etiology early so that the infected tissue

may be removed and specific general therapy applied. Infection is always the result of perforation of the globe with a metallic foreign body which must come in contact with the vitreous. After four to 21 hours of incubation, the first signs of severe infection appear. In eighteen to 45 hours full-blown ophthalmitis is evident. Sanguinolent fluid exuding from the wound and gas bubbles in the globe are particular characteristic signs. The general condition of the patient is either strikingly good or suggestive of peritonitis—depending upon whether the infection is pure or mixed. The infection is more common during the colder months.

In contrast to gas bacillus infection in the muscles, neither pure nor mixed ocular infection has ever been observed to lead to generalized infection or death. Left untreated, it leads to phthisis bulbi. In the Halle clinic, evisceration of the globe is performed, although enucleation is advised by some workers and has no disadvantages.

It is advisable to use specific antiserum. F. Herbert Haessler.

Deutman, A. **Recovery after magnet extraction of a fragment of iron in the lens after forty days.** Klin. M. f. Augenh., 1938, v. 100, March, p. 444.

A patient presented himself with a clear lens and healed capsule and an intralenticular splinter of iron 39 days after injury. The author moved the splinter from the lens to the anterior chamber with a giant magnet and then removed it through a keratome incision with a hand magnet. He quotes the opinions of other writers to show that there is diversity of opinion as to whether an intralenticular foreign body in a clear lens and quiet eye should be extracted. F. Herbert Haessler.

Gsell, J. T., and Gsell, G. F. **Anaërobic panophthalmitis.** Jour. Kansas Med. Soc., 1937, v. 38, May, p. 193.

The authors report a case of anaërobic panophthalmitis due to vibrion septique following entrance into the eye of a steel foreign body. Within 36 hours after the injury the eye was stony hard and the lids and eyeball presented the signs and symptoms of acute panophthalmitis. Evisceration was performed. Culture examinations were made.

F. M. Crage.

Handmann, Wolfgang, Jr. **Central retinal injury from the radiant energy of lightning.** Klin. M. f. Augenh., 1938, v. 100, March, p. 438.

In a seventeen-year-old patient, cloud-like opacities developed in each fovea after exposure to the blinding light of lightning that had struck near by. Vision was reduced to 6/18 and 6/36 and there was bilateral central scotoma. Recovery of normal structure and of function was complete in several weeks.

F. Herbert Haessler.

Iofe, T. M., and Kaplan, I. D. **Studies in occupational diseases of the visual organ during the twenty years of the Soviet.** Viestnik Opht., 1937, v. 11, pt. 4, p. 464.

A description of the ophthalmic contribution to the prophylaxis of occupational diseases. It includes extensive research on electric ophthalmia, toxic amblyopia, miner's nystagmus, adaptation, and depth perception.

Ray K. Daily.

Jess, Adolph. **Luxation of the eyeball into the antrum and illusion of anophthalmos at autopsy.** Klin. M. f. Augenh., 1938, v. 100, March, p. 353.

A woman in falling had struck her head against a door. One eyeball was

not only ruptured but luxated into the antrum through a fracture in the floor of the orbit. After a similar injury reported in 1575, a boy probably sustained a fracture with secondary dislocation of his only globe through the floor of the orbit. For years the boy is said to have been able to see by holding objects near his nostril. Possibly it is better to leave a dislocated globe in the new place and limit what surgery is performed to exposing the eye so that vision will be made possible. Another dislocation, described to the author by a colleague, is also briefly reported.

F. Herbert Haessler.

Krol, A. G. **Is X ray always necessary in ocular traumatism?** Viestnik Opht., 1937, v. 11, pt. 5, p. 707.

The author's answer is yes, and he reports three cases in which X rays revealed the presence of hitherto unsuspected intraocular foreign bodies.

Ray K. Daily.

Lloyd, R. I. **Birth injuries of the cornea and allied conditions.** Amer. Jour. Ophth., 1938, v. 21, April, pp. 359-364; also Trans. Amer. Ophth. Soc., 1937, v. 35, p. 212.

Mettler, C. C. **Dugas on the removal of foreign bodies from the eye.** Arch. of Ophth., 1937, v. 18, Dec., pp. 998-999.

This is a reprint of an article read in 1876, in which the author suggested placing the end of the index finger upon the eye just within the canthus to hold the attention of the patient and prevent his moving the eye while the foreign body was being removed.

J. Hewitt Judd.

Prigojina, A. L. **Ocular injuries with fragments of glass.** Viestnik Opht., 1937, v. 11, pt. 4, p. 572.

An analysis of 83 injuries relative to age, eye, sex, site of injury, complications, and results. Ray K. Daily.

Rosenblum, M. E. **Diascleral extraction of intraocular foreign bodies and prophylaxis against retinal detachment.** Viestnik Opht., 1937, v. 11, pt. 5, p. 630.

The author champions the diascleral route. To prevent subsequent retinal detachment he electrocoagulates the portion of the sclera through which the incision is made. Of 550 intraocular foreign bodies 56 were visible in the fundus. In nine out of 82 diascleral attempts at extraction the foreign body could not be extracted: in six of these nine it was located in the ciliary body. Thirty-five cases treated by electrocoagulation and diascleral extraction convince the author of the value of electrocoagulation as a prophylactic against retinal detachment.

Ray K. Daily.

Shagov, M. A. **First aid in ocular traumatism.** Viestnik Opht., 1937, v. 11, pt. 5, p. 710.

A criticism of the first aid in ocular traumatism available in the industries, and a plea for training physicians in charge of industries in correct management of ocular injuries.

Ray K. Daily.

Tertsch, Rudolph. **Two-way roentgen observation of non-magnetic intraocular foreign body during course of extraction.** Klin. M. f. Augenh., 1938, v. 100, March, p. 339.

The author describes in detail the apparatus and method of operation which he modified on the basis of Cross's technique (see Amer. Jour. Ophth., 1929, v. 12, p. 444) for use on three patients with non-magnetic intraocular foreign body. His equipment gives very free

access to the eye during surgical manipulation. F. Herbert Haessler.

Tromeur, E. J. Y. **Foreign body of the eye tolerated for 29 years.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, Feb., p. 124.

In 1907 a mechanic then 23 years old developed iridocyclitis in the left eye. Examination showed a perforating wound in the sclera near the limbus at the 11-o'clock position. An attempt was made to remove the foreign body with a weak magnet. Vision in the left eye at that time was 0.01. The eye quieted down and two months later the vision had improved to 0.7. Twenty-five years later the left eye flared up with intense keratitis, the vision being reduced to 0.1. In 1936, 29 years after the injury, the patient was examined again. The foreign body was seen encysted, entangled in the posterior portion of the iris and attached to the lens, which was discretely cataractous. Vision was reduced to 0. Exudate was present in the anterior chamber. The patient refused surgical intervention and the eye quieted down under treatment, but three months later he entered the hospital for the fourth time suffering with severe pain in the eye. The cornea was hazy, there was marked ciliary congestion, and a yellow abscess surrounded the foreign body. The iris was discolored and was traversed by numerous new blood vessels. Enucleation was accepted. (Bibliography.) Derrick Vail.

Vejdovsky, V. **The influence of liquid yperite upon the eyes of some animals.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 169-177.

In comparing the tables of clinical observations after applying liquid yperite to the corneas of various animals, the following facts were ascertained: The reaction is most powerful in the pig: a 1 to 1000 solution has caused corneal ulceration, and complete synechia between the lids and globe. In the dog and rabbit a similar solution caused only temporary hyperemia. Pure yperite dropped into the rabbit's eye caused results similar to those in the pig's eye, but less severe. The symptom, common to all animals whose eyes were burned by yperite, is a purulent or mucopurulent inflammation of the conjunctiva with swelling of the lids. In the dog recovery takes place through conjunctival cicatrization but eye movement is preserved, and even when a one to ten solution was used no symblepheron developed. The rabbit's eye reacts similarly to the dog's, but there is more rigidity of the lids, even after complete recovery. Another symptom is loss of hair from the skin of the eyelids of rabbits or dogs, and loss of some bristles from the pig; this baldness being noticeable especially on the lower eyelid, where the pus accumulates and causes a fresh lesion of the skin. The corneal lesions presented no characteristic symptom. (Note: Yperite is a dichlordiethyl sulphide, that is the sulphuric dichlorate of ethel.)

Georgiana D. Theobald.

Venco, Luigi. **A case of incomplete syndrome of the apex of the orbit of traumatic origin.** Riv. Oto-Neuro-Oft., 1937, v. 14, Jan.-Feb., pp. 20-47.

A man of 29 years, as the immediate result of a blow sustained on the left temporal region, became affected by a drooping of the upper lid of the same side and outward deviation of the eyeball. The corresponding pupil was found dilated and immobile, and all extrinsic muscles supplied by the third nerve were paralyzed. This eye was also affected by marked loss of vision

and concentric contraction of the visual field for form and colors, especially below and nasally. The optic disc was pale, with typical atrophic excavation. X-ray examination showed signs of a fracture of the lesser wing of the sphenoid. After lengthy discussion the writer locates the cause of all the symptoms at the apex of the orbit. The basic lesion was indirect fracture of the lesser wing of the sphenoid, with contusion, or compression, or laceration of the nerves in that location. (Bibliography, 5 figures.) M. Lombardo.

Wagner, Hans. **Pathologic and therapeutic action of the penetrating ultrared rays on the eye.** Graefe's Arch., 1938, v. 138, pt. 4, p. 486.

With the short-wave penetrating ultrared rays it is possible to produce cataract experimentally not only in the pigmented but also in the albinotic rabbit eye. Isolated opacities of the lens are so produced. Later histologic examination of the albino eyes that had been rayed presented no anatomic changes in the iris. Opacities were never observed where the iris covered the lens. Lens opacities were much more frequently confined to that part of the lens which is traversed by the short-wave ultrared rays. With the long-wave, non-penetrating ultrared rays, without burning the eye externally, it was never possible to produce any but the slightest injury to the lens. Exactly the same conditions obtain in the cases of glassblowers and foundry-workers. The injury to the lens is not secondary to the effect of heat on the iris, but results from the absorption by the lens of the penetrating short-wave ultrared rays. With intensities of penetrating short-wave ultrared rays that are not capable of causing lens opacities, it has been found possible to obtain a favorable therapeutic effect in tuberculous nodules of the iris, tuberculous iridocyclitis, episcleritis, and phlyctenulosis. H. D. Lamb.

Zahor, Aleksej. **Insurable occupational diseases from the ophthalmologist's viewpoint.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 222-228.

The author discusses various diseases due to chemical and mechanical injuries, including X ray; also infections following injuries.

Georgiana D. Theobald.

17

SYSTEMIC DISEASES AND PARASITES

Balzano, Ippolito. **Sphenoidal sinusitis and perioptic and meningeal inflammatory extension.** L'Oto-Rino-Laring. Ital., 1937, v. 7, Aug., pp. 351-387.

Somewhat diffusely, and without recital of individual case records, although with a number of excellent illustrations, the author discusses the anatomy, symptomatology, and diagnosis of sphenoidal sinusitis in connection with inflammatory perioptical and meningeal disorders. He refers repeatedly to the work of Proetz. W. H. Crisp.

Calhoun, F. P. **Intraocular invasion by the larva of the ascaris.** Arch. of Ophth., 1937, v. 18, Dec., pp. 963-970; also Trans. Amer. Opht. Soc., 1937, v. 35, p. 226.

A boy aged eight years first presented an acute iridocyclitis and secondary glaucoma. After this subsided the lens became dislocated, and soon after this the larva made its appearance on the anterior surface of the lens. Two weeks later it was noted that the larva was dying and disintegrating. Seven weeks after the larva first appeared there was an acute flare-up of the iritis and an

attempt to remove the larva was unsuccessful. The eye became quiet and after seven months the larva had been completely absorbed. (Photograph.)

J. Hewitt Judd.

Fazakas, Alexander. **The mold fungi of the healthy and the diseased eye.** Graefe's Arch., 1938, v. 138, pt. 4, p. 416.

Among 1,791 persons, 2,530 eyes were examined for fungi. In 495 of 1,335 diseased eyes and in 117 of 456 healthy eyes, fungi could be cultured. From these 612 positive cases, 42 varieties of fungi were isolated. Their distribution is presented in a table. A second table lists 48 ocular conditions, with the number for each of the 42 varieties of fungi. Fungi were particularly common in the different kinds of conjunctivitis, in trachoma, serpent ulcer, blepharitis, blepharoconjunctivitis, and meibomitis, and in blockings of the tear passages. Three or four varieties of fungi were sometimes present in the same ocular condition. H. D. Lamb.

Gray, W. A. **Experimental tuberculosis of the eye.** Jour. Path. and Bact., 1937, v. 45, Nov., pp. 647-652.

Injection of an emulsion of tubercle bacilli into the posterior chamber was followed by an acute inflammatory reaction in thirteen cases and a chronic one in fifteen, the degree of reaction depending on the virulence of the strain of the organisms. The cellular response spread by contiguity. Infection of the vitreous did not always arise, the anterior segment alone being at times affected. The lesion at the optic disc usually equalled that at the injection site. General infection occurred in six of the thirteen acute but in none of the fifteen chronic cases. T. E. Sanders.

Hansel, F. K. **Allergy as related to otolaryngology and ophthalmology.** Jour. of Allergy, 1938, v. 9, Jan., pp. 189-198.

The literature of 1937 on allergy from the standpoint of ophthalmology and otolaryngology is completely reviewed. Twenty-seven articles relating to the nose and throat are reviewed but only three pertaining to allergic eye disease are mentioned. T. E. Sanders.

Hermans, R., and Debroeu, G. **Paraocular affections of dental origin.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 19.

Two case reports and seven references. It is concluded that one must not omit examination of the denture when consulted concerning an oculomotor or facial paralysis; or a lacrimal or prelacrimal infection of indeterminate etiology. J. B. Thomas.

Jebavy, Jan. **Three cases of dermatosis with eye complications.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 332-337.

A baby girl seven months old developed impetigo vulgaris of the face, which spread to the conjunctiva and cornea of both eyes, and in 24 hours led to complete destruction of both corneas. The infant died of streptococcic septicemia. A twelve-month-old boy and a fourteen-month-old girl, ill with varicella, developed ulcers on the eyelids. The boy died of septicemia. The ulcers on the girl's eyelids healed with scar formation.

Georgiana D. Theobald.

Juhasz-Schaeffer, A. **Hemeralopia in pregnancy, and vitamin A.** Klin. Woch., 1938, v. 17, March 19, pp. 407-409.

Of 38 pregnant women examined for disturbances of dark adaptation the author found such defects in nine. Two of them had no general complications,

two had renal neuroretinitis, three were suffering from hyperemesis gravidarum, and two of them were habitual aborters. In all these cases, quantitative tests for vitamin A after the Carr-Price method were made, and the level of vitamin-A content was found far below normal. All the patients, with exception of one case of severe hyperemesis, showed improvement after intake of large doses of wheat oil, which has a high carotin and vitamin-E content.

Many authors consider the origin of the A-hypovitaminosis in pregnancy a defective resorption of vitamin A. The authors of this paper believe, however, that it is rather due to exhaustion of the vitamin-A reserve, which is usually large in the female body. In the development of the fetus not only the vitamin content of the daily foods but also the vitamin reserve of the body is utilized, and thus deficiencies may arise. They advise routine photometric tests in pregnancy. Bertha Klien.

Meyer, K., Dubos, R., and Smyth, E. **The hydrolysis of the polysaccharide acids of vitreous humor, of the umbilical cord, and of streptococcus by the autolytic enzyme of pneumoccus.** Jour. Biol. Chem. 1937, v. 118, March, p. 71.

The authors state that the lytic enzyme of pneumococcus hydrolyzes three polysaccharide acids of apparently identical structure obtained from the vitreous, umbilical cord, and group A streptococcus. The action of the same lysin on pneumococcus seems to be due to a hydrolysis of a similar substrate present in the pneumococcus cell, at present unkown. The similarity of action is shown by (1) their p_H optimum, (2) their heat inactivation at the same temperature, (3) their reversible oxidation by iodine.

Theodore M. Shapira.

Mustard, Roy. **A case of ocular myiasis.** Canadian Med. Assoc. Jour., 1937, v. 37, July, p. 67.

A case report occurring in 34-year-old woman whose complaint was itching of the eye. On examination nine maggots were found in the conjunctival sac. Complete recovery was induced merely by removing them and by irrigation. (2 references.)

Ralph W. Danielson.

Mutch, J. R., and Griffith, H. D. **A study of diet in relation to health. (Dark adaptation etc.).** Brit. Med. Jour., 1937, Sept. 18, p. 565.

In England, because of improved dietary conditions, there is almost no night blindness. Nevertheless, partial degrees of low avitaminosis-A might now be of more importance than formerly because of motor driving and aviation and also because of the fact that glare, so common in our present day civilization, is thought to have a very detrimental effect on light adaptation. The authors report a description of the apparatus and technique used in testing a rather large number of young people and children. The estimation of power of dark adaptation by means of Edmund's hemeralopia test type and Tscherning photometric glass is described and preliminary results are presented. A limit is shown below which all subjects react with improved adaptation to administration of vitamin A. Those whose first performance is above this limit give no response to vitamin A. The test is sufficiently simple to be applied to intelligent children of six years, and so short that it is suitable for serial examinations. The results are unaffected by practice. (16 references.)

Ralph W. Danielson.

Rhodes, A. J., and Van Rooyen, C. E. **Inclusion bodies in corneal tissue cultures infected with vaccinia virus.** Jour. Path. and Bact., 1937, v. 45, July, p. 253.

Tissue cultures from the rabbit cornea, consisting purely of epithelial cells, showed no departure from normal when exposed to the action of vaccinia virus. In cultures consisting of all corneal layers, fibroblasts growing in the substantia propria developed characteristic inclusion bodies. These cells also increased markedly in number and size. (7 references.) Ralph W. Danielson.

Stauffer, Fred. **The causal relationship of disease and deformities of the nose to disease of the eye.** Trans. Pacific Coast Oto-Ophth. Soc., 1936. v. 21, pp. 95-101.

This paper emphasizes disease conditions in the nose commonly met with which react upon the eye and cause such diseases as orbital cellulitis or retro-bulbar neuritis, and various conditions of the anterior pole of the eye. The intimate relation of the various nasal sinuses to the eye and optic nerve is stressed. Reflex disturbances from the nose, causing conjunctivitis and lower vitality in the structures of the anterior segment of the eye, are considered to make the eye more susceptible to focal infections. Toxin absorption from adjacent diseased sinuses makes the relationship of the eye to the nose important in disease.

Lawrence G. Dunlap.

Strebel, J. **Allergy and vascular hypotony.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 243.

Allergy is dominantly inherited and may become phenotypically manifest in a variety of forms such as eczema, migraine, and asthma. In the mosaic of gens such correlations represent true congruities and might be called "allergic congruities." The author reports on 33 patients who present a new hereditary allergic congruity; namely, vascular hypotony with other allergic phenomena, in this case, hay fever. The hypotony is not correlated with constitutional types. The results of therapy lend support to the theory that allergic individuals have an insufficiency in the adrenal system. Vagus and sympathetic systems are not in balance and are more easily regularized by atropine and adrenalin combined than by adrenalin alone. F. Herbert Haessler.

Weisz, Alexander. **Ophthalmomyiasis interna.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 337-340.

The author reports a case of larval infection of the anterior chamber in a fifty-year-old man. The larva, 1 by 8 mm., was "Wohlfahrtia magnifica," the product of a fly that infests barns and cow sheds. A gray area on the cornea showed the path of the larva from the cornea into the anterior chamber. The larva lost its motility after atropine was used. It gradually disintegrated and was lost from the anterior chamber. The patient was under observation for about two months. Georgiana D. Theobald.

Wibo. **Ciliary migraine.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 66.

The so-called "nasal nerve syndrome" is characterized by (1) a definite inflammatory lesion of the anterior half of the eye, (2) paroxysmal pains in the corresponding orbitonasal region, (3) a massive hydrorrhea accompanying the crises. Ciliary migraine is a morbid entity which resembles the above syndrome in its symptomatology, but differs entirely in pathogenesis and therapeutic indications. It is characterized by paroxysmal facial neuralgia, occurring at fairly regular intervals, the attacks lasting ten to fifteen minutes, and

affecting one eye or sometimes both. The affected eye becomes violently congested and the severe pain involves the corresponding temple, cheek, and jaw. Ophthalmic migraine differs from ciliary migraine in two cardinal respects; the former presenting hemianopsia and scintillating or color scotomas.

The nasal nerve syndrome is due to neuritis of the nasal nerve and its treatment is exclusively nasal. There appears to be a more direct pathogenic connection between ciliary and ophthalmic migraine, the latter due to spasm of the posterior cerebral artery, the former to spasm of the middle meningeal artery. The author relieves ciliary migraine by alcohol injections into the supraorbital and infraorbital nerves. In case of recurrence the injection is made into the lower two thirds of the Gasserian ganglion. J. B. Thomas.

Woods, A. C. **The problem of ocular tuberculosis.** Amer. Jour. Ophth., 1938, v. 21, April, pp. 366-383.

Yamaga, Isanne. **Experimental investigation of cysticercus fasciolaris in the anterior chamber of rabbits.** Klin. M. f. Augenh., 1938, v. 100, March, p. 414.

Cysticercus fasciolaris is the embryonic stage of the tapeworm crassicolis, which lives in the liver of rats and mice. The author reports the effects of 85 successful transplants of these cystic structures into the anterior chambers of rabbits' eyes. The smaller vesicles, 0.1 to 2.0 mm. in diameter, are destroyed immediately after causing severe reactions including clouding of the cornea and vascular proliferation. The moderate-sized embryo is almost full grown, the scolex is everted and elongated, and the total length of the embryo varies between 10 and 50 mm. The reaction to worms of this size is tremendous, with complications such as iris prolapse and corneal staphyloma and ectasia. Despite this fact, in one eye a worm remained alive for 38 days.

F. Herbert Haessler.

Zanen, Jules. **Extraction of a subconjunctival filaria.** Bull. Soc. Belge d'Opht., 1937, no. 74, pp. 66.

Report of a case with illustration. By the reporter, and in discussion, the point is established that in preparation for operating on such a case solutions should be used warm, in order to avoid disappearance of the filaria.

W. H. Crisp.

18

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Black, W. B. **Ocular hygiene.** Jour. Missouri State Med. Assoc., 1937, v. 34, Aug., p. 289.

Early examination of all school children should be carried out by an ophthalmologist under cycloplegia, even though the vision may be found normal when first tested. Provocative glaucoma tests are urged in borderline cases. Epinephrine is recommended as a safer adjunct in fundus examinations in glaucoma, and in treatment of glaucoma and iritis. Eyes should be under the care of a competent ophthalmologist from prenatal life to old age. F. M. Crage.

Chirkovskii, V. V. **The conquest of trachoma during the twenty years since the Revolution.** Viestnik Opht., 1937, v. 11, pt. 4, p. 455.

A description of the fight on trachoma from a research as well as a clinical viewpoint. Ray K. Daily.

Demaria, E. B. **Prophylaxis of trachoma in the Argentine Republic.** La Semana Med., 1938, v. 45, March 17, p. 565.

A lengthy paper without much circumstantial detail concerning local conditions and activities.

Greeff, R. **What likenesses of Albrecht Graefe do we possess? 2. His portraits in systematic arrangement.** Graefe's Arch., 1938, v. 138, pt. 4, p. 303.

Description is given of the principal bust portraits of Graefe and their modifications both from lithographs and photographs. These include the medal with head of Graefe in possession of the Deutsche Ophthalmologische Gesellschaft in Heidelberg; the famous memorial to Graefe in Berlin at the corner of Luise and Schumann streets; an oil painting in the possession of the Berliner medizinische Gesellschaft (of which Graefe was a member from its foundation until his death); a representation of Graefe and Donders, standing together, in the historical section of the Kaiserin Friedrich House for Medical Progress; a full-length view of Graefe and his wife taken in 1869, when already he was mortally ill. Seven of these likenesses of Graefe are reproduced with the present article.

H. D. Lamb.

Jackson, E. **Vision in the schools.** Trans. Pacific Coast Oto-Ophth. Soc., 1936, v. 21, pp. 118-132.

The handicaps of poor vision and effect on health and mental development in school children are discussed. The importance of good illumination in schools and for near work is stressed. The sight and hearing of each child should be tested at the time he enters school. Lawrence G. Dunlap.

MacCallan, A. F. **National policy to be adopted in a tropical country for the prevention of blindness.** Brit. Jour. Ophth., 1938, v. 22, Feb., pp. 65-78.

First defining, and then discussing the cause of, blindness, the author elaborates upon the national policy for preventing loss of sight in Egypt, a tropical country. (See previous writings.) Through this extensive program, the percentage of blindness in one or both eyes among those reporting for hospital care has been reduced from 19.2 in 1911 to 6 in 1935. (Table.)

D. F. Harbridge.

Savaitov, A. S. **Ocular service in Russia during the last twenty years.** Viestnik Opht., 1937, v. 11, pt. 4, p. 447.

Czarist Russia bequeathed the Soviet government a quarter of a million totally blind people. The ophthalmologic department of the Public Health Service has set as its task the elimination of trachoma, ophthalmia neonatorum, luetic diseases, and blindness caused by smallpox. The effort has been successful. Trachoma has been greatly diminished, and blindness due to smallpox is being eliminated with the elimination of smallpox. Credé's method has eliminated ophthalmia neonatorum. The present objectives are a clarification of the problems of glaucoma and of ocular traumatism. Ray K. Daily.

Tsang, F. S. **Ophthalmic surgery among the Chinese, with a brief study of 1,000 cases.** Chinese Med. Jour., 1937, v. 52, July, p. 53.

This article consists largely of a tabulation and classification of 1,000 surgical operations at Saint Luke's Hospital in Shanghai. The outstanding feature is the unusual amount of surgery upon the lids.

Ralph W. Danielson.

Vanysek, Jan. **Trachoma statistics.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 290-294.

Trachoma statistics of the past fifteen years show a steady decrease of the disease in Moravskoslesko, in compari-

son to the prevalence of the disease before the war and immediately afterward. The author attributes this to intelligent treatment by the medical profession, and to the faithfulness of the patients. It is hoped that in the next generation trachoma will not be a problem, but a rare disease.

Georgiana D. Theobald.

Vasutinskii, A. G. **An attempt to organize intermittent courses on trachoma and first aid for rural physicians.** Viestnik Opht., 1937, v. 11, pt. 4, p. 583.

A discussion of an administrative problem. Ray K. Daily.

19

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Adrian, E. D. **Synchronized reactions in the optic ganglion of Dytiscus.** Jour. of Physiology, 1937, v. 91, Oct. 18, p. 66.

Because in previous studies the optic ganglion of the water beetle (Dytiscus marginalis) showed rhythmic potential oscillations apparently due to synchronous activity in the nerve cells, a further study was made in the hope that the results would show what might be expected of nerve cells in general. In a fresh preparation of Dytiscus a generalized rhythm is only obtained when the eye is exposed to very bright light. Some hours after the preparation has been made, a slower potential rhythm appears when the eye is in complete darkness. When the dark rhythm has developed, the ganglion shows the two fixed potential rhythms corresponding to bright light and no light. With dim or medium light, there is no generalized rhythm but there is the usual irregular discharge of impulses in the optic nerve. The dark rhythm is regarded as representing a spontaneous discharge in neurons which respond at a higher rate on illumination.

The potential changes in the ganglion resemble those in other groups of nerve cells. Fixed potential rhythms need not imply a fixed frequency of response in the neurons which contribute to the waves. Synchronized waves are most likely to occur when the frequencies are near the maximal or minimal values for these neurons.

Edna M. Reynolds.

Crozier, Wolf, E., and Zerrahn-Wolf. **Critical illumination for response to flickered light, with dragonfly larvae (Anax), in relation to area of eye.** Jour. Gen. Physiology, 1937, v. 21, Nov. 20, p. 223.

Arthropods with large convex eyes provide flicker curves which are different from the type characteristically found with vertebrates. By means of experiments with Anax nymphs in which various parts of the eye were made opaque, it was shown that the special shape of flicker curve is due to the mechanical disadvantage of the periphery of the eye in the reception of light which is overcome by higher intensities.

Edna M. Reynolds.

Ringoen, A. R., and Kirschbaum, A. **Correlation between ocular stimulation and spermatogenesis in the English sparrow.** Proc. Soc. Exper. Biol. and Med., 1937, v. 36, March, p. 111.

The authors state that the importance of the daily ration of light in the sex cycle of certain birds is well established. The male English sparrow is brought to full spermatic activity within six to eight weeks during fall and winter by daily exposure to six or seven hours of light. Experiments show that the testicular response to light depends largely on the reception of stimuli through the ocular region.

Theodore M. Shapira.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 S. Kingshighway, St. Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. Charles Peter Winter, Wilmington, Del., died April 13, 1938, aged 67 years.

Dr. Edward Frost Parker, Charleston, S.C., died March 28, 1938, aged 70 years.

Dr. Edward Josiah Brown, Minneapolis, Minn., died March 15, 1938, aged 87 years.

Miscellaneous

On August 8, 9, 10, and 11, 1938, the University of Rochester School of Medicine and Dentistry, Department of Ophthalmology, will offer a comprehensive symposium on refraction and related subjects. While concentrating on this single important phase of the practice of ophthalmology, sufficient time will be allowed for thorough discussions with the visiting lecturers, who are eminent in the field of medical refraction problems.

The annual dinner of the Royal London Ophthalmic Hospital took place on Thursday, March 10, 1938, at the Langham Hotel.

The 27th Annual Meeting of the Oxford Ophthalmological Congress was held from July 6 to 9, 1938. An interesting and instructive program was given.

The Leslie Dana Gold Medal, awarded annually for "outstanding achievements in the prevention of blindness and the conservation of vision," was presented this year to Dr. Ellice M. Alger of New York City. Dr. Alger was selected for this honor by the Association for Research in Ophthalmology in coöperation with the St. Louis Society for the Blind, through which the medal is offered by Mr. Leslie Dana of St. Louis. Dr. Alger was one of the founders, in 1915, of the National Society for the Prevention of Blindness, and he has served continuously on its Board of Directors. The organization adopted as a policy the following statement which he made soon after it was founded: "Nothing that concerns the saving of sight is a matter of indifference to us." Several years earlier, he had been a member of the Sub-Committee on Prevention of Blindness organized by the New York Association for the Blind.

Records of the American Medical Association show that at least 20 deaths and more than 7,000 reportable injuries resulted from accidents during the observance of Independence Day last year. These cases included approximately 300 serious ocular injuries, 16 of which resulted in the complete loss of an eye.

As a substitute for the old-fashioned custom of celebrating the Fourth of July with fireworks in the hands of individuals, the National Society for the Prevention of Blindness advocates community celebrations which include attractive and exciting pyrotechnic displays under the supervision of experts.

The Cirincione-Cidonio Foundation and the Eye Department of the Royal University of Rome offers, in behalf of ophthalmologic studies, the following prizes to be awarded at the meeting of the Societa Oftalmologiea Italiana in 1940: (1) Cirincione prize: A cash prize of Lire 20,000 (international) to be awarded for an original work in the ophthalmologic field completed during the years 1938 and 1939. Gold medals will be awarded to the second and third of the three best essays. Titular professors of ophthalmology and ophthalmologists older than 45 years are excluded. Essays (in Italian) are to be sent to Professor Leonardi as above, not later than August 31, 1939.

Cidonio prize: A cash prize of Lire 7,000 (national) is to be awarded for the best work completed during the years 1938 and 1939 by an Italian ophthalmologist not older than 45 years. The essay must be sent to Professor Leonardi, as above, not later than May 31, 1939.

Societies

The Board of Directors of the Societa Oftalmologiea Italiana has chosen the following special topics for discussion at the meeting to be held in Florence in May, 1939: (1) Vitamins and the eye, by Dr. G. B. Bietti; (2) Surgical therapy of glaucoma with special regard to late results, by Dr. Emilio Raverdino. The Board offers cash prizes of 2,000, 2,500 and 1,000 Lire, to be awarded respectively at the time of the meeting to the best works on experimental ophthalmology, on ocular therapeutics, and on ocular tuberculosis. Three typewritten copies of the essay (in Italian) are to be sent not later than January 31, 1939, to the Secretary, Professor E. Leonardi, No. 1, Via del Gianicolo, Rome, Italy.

The new Council of the Ophthalmological Society of Egypt has been formed for the year 1938 as follows: President, Dr. Mohammed Mahfouz Bey, Principal Medical Officer, Ophthalmic Section, Government Hospital, Alexandria; Vice-President, Dr. Hassan Barrada Bey, Ophthalmic Inspector, Ministry of Public Health, Cairo; Honorary Treasurer and

Archivist, Dr. Eisa Hamdi El Maziny Bey, Director, Ophthalmic Hospitals, Ministry of Public Health, Cairo; Honorary Secretary, Dr. Mohammed Kahlil, Ophthalmic Surgeon, Galawoon Hospital, Cairo; Honorary Assistant Secretary, Dr. Ahmed Abdel Rehim Fahmy, Tutor, Ophthalmic Hospital, Giza. All communications are to be addressed to the Honorary Secretary, Ophthalmological Society of Egypt, 4 Baehler Street, Cairo.

The Mississippi Valley Medical Society, Tri-State Post-Graduate Assembly of Illinois, Missouri, and Iowa, will hold its Fourth Annual Meeting at Hannibal-LaGrange College, Hannibal, Mo., September 28, 29, 30, 1938.

The 17th annual scientific and clinical session of the American Congress of Physical Therapy will be held coöperatively with the 22d annual convention of the American Occupational Therapy Association, September 12, 13, 14, and 15, 1938, at the Palmer House, Chicago. Preceding these sessions, the Congress will conduct an intensive instructive seminar in physical therapy for physicians and technicians —September 7, 8, 9, and 10.

The convention proper will have numerous special program features, a variety of papers and addresses, clinical conferences, round-table talks, and extensive scientific and technical exhibits.

The instruction seminar should prove of unusual interest to everyone interested in the fundamentals and in the newer advances in physical therapy. The faculty will be comprised of experienced teachers and clinicians; every subject in the physical-therapy field will be covered. Information concerning the convention and the instruction seminar may be obtained by addressing: The American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

The Chengtu Eye Ear Nose and Throat Society, the first society in China representing jointly those practicing in ophthalmology and in otolaryngology, was organized at the Eye Ear Nose and Throat Hospital in Chengtu, West China, on December 14, 1937. The following officers were elected: President, Dr. Eugene Chan; Vice-president, Dr. Robert A. Peterson; Secretary, Dr. C. C. Teng; Treasurer, Dr. C. R. Peng; Editorial Committee, Drs. K. C. Lang, M. L. Hu, and C. C. Teng. Of the six Chinese named, three have studied abroad, Dr. Chan at Johns Hopkins, Dr. M. L. Hu with Dr. Mosher at Harvard and Dr. Lan in Edinburgh. The other three were trained at the Peiping Union Medical College, and the West China Union University.

The Society will meet at the Chengtu Eye Ear Nose and Throat Hospital on the second Tuesday of each month at 6 P.M. The members of this society are derived from the departments of ophthalmology and otolaryngology of the West China Union University of Chengtu, of the National Medical College of Nanking, and of Cheeloo University of Tsinan, Shantung, and from practitioners in Chengtu and other centers in West China who are specializing in these fields. The transfer of faculties and students of medical schools in the warzone in East China to Chengtu, West China, a distance of nearly two thousand miles, has created here a unique center of teaching and clinical activity. This transfer has afforded the opportunity of combining the staffs of the departments of ophthalmology and otolaryngology from these various schools with that of the College of Medicine of the West China Union University in the continued development of its undergraduate and graduate teaching and clinical program.

The Twentieth Annual Session of the North Dakota Academy of Ophthalmology and Otolaryngology was held at Bismarck May 17, under the presidency of Dr. H. P. Rosenberger, Bismarck.

Dr. Ernest Sachs, St. Louis, presented an address on "Some of the ocular, otological, and rhinological symptoms of brain tumor." Dr. Fredrick A. Figi, Rochester, Minn., spoke on "Tumors of the larynx." Case reports were presented by Drs. Harmon Brunner, Minot, and N. A. Youngs and L. Alger, Grand Forks. Dr. N. A. Youngs was elected to the presidency.

PERSONALS

Mr. H. L. Eason, C.M.G., has been elected a Fellow of University College, London.

Mr. Robert Buxton has been appointed Hon. Ophthalmic Surgeon to the Weston super Mare General Hospital.